uary 1949

Chemical Industries

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Cover: Furnace black plant in Oklahoma

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Chemical Industries

"SERVING THE CHEMICAL PROCESS INDUSTRIES"

VOLUME 64 — NUMBER 1 JANUARY, 1949

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Friendly with Labor
Polyhydric Alcohol

Trips for Plant Men
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A MACLEAN-HUNTER publication, Horace T. Hunter, President

Jan. 1949

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Plasticizer OF THE MONTH

DICAPRYL SEBACATE

PROPERTIES

Molecular Weight 426
Boiling Point 231.5-239°C @ 4 mm.
Specific Gravity 0.9136 @ 20°/20°C
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THE READER WRITES

First of Its Kind

To the Editor of Chemical Industries:

We have just read with great interest the article "Proving Chemical Processes in Large Glassware" on page 782 of CHEMICAL INDUSTRIES for November, 1948. We have watched this type of work for glassware grow gradually over a period of years, but to the best of our knowledge, this is the first instance in which a specific laboratory was set up to use this equipment.

P. M. REYNOLDS,
Sales Promotion Mgr.
Corning Glass Works
Corning, New York

Identify Manufacturers With Equipment

To the Editor of Chemical Industries:

I congratulate CHEMICAL INDUSTRIES on the review of drying equipment in the October, 1948, issue. Articles of this type are of paramount interest to a chemical engineer. When he is presented with a problem, an engineer first refers to review articles such as this for his important general information before he proceeds with design of a given type.

In future articles of this kind I would like to suggest that you indicate which of the companies in the "Acknowledgement" manufacture each type of equipment. This could be done simply with superscript numbers on each subtitle in the discussion, and placing the appropriate numbers with the company's name in the acknowledgement.

NORBERT J. FOECKING
Cornell University
Ithaca, N. Y.

External Heating Long Used In Wood Preserving Industry

To the Editor of Chemical Industries:

On Page 597 of the October issue there is an article entitled "An Improved System for Heating Storage Tanks."

We find this article extremely interesting but thought that you would like to know that the idea is not novel. More than 15 years ago we installed a system of heating our coal-tar creosote storage tanks by a method almost identical with that described in the article. In our set-up we also had automatic controls, both on the pump and the heating unit whereby any desired constant temperature could be maintained in the tanks at all times.

Almost 25 years ago we installed in our coal-tar creosote work tanks an outside heating system which did not require the use of pumps, since it was possible to heat the creosote by the thermal syphon principle.

Some 20 years ago the Consolidated Gas, Electric Light and Power Company in Baltimore had a set-up as described in your article but so designed that it could be applied to storage tanks, work tanks, and tank cars containing coal-tar creosote, which was employed by that company in their butt-treating plant.

In the wood-preserving industry, the principle of outside heating units has been applied for more than a quarter of a century, some producers going so far as to design outside units for use on their pressure treating cylinders.

J. A. VAUGHAN
Research Engineer
Southern Wood
Preserving Co.
Atlanta, Ga.

Trap for Smells

To the Editor of Chemical Industries:

I am asking permission to reproduce the article "Trap for Smells" which deals with the subject of elimination of odors in storage of foods and which appeared in your issue of September, 1948. This is an excellent article, and I will appreciate your cooperation in making it available to our Foundation members, who include primarily refrigerated warehouses.

H. C. DIEHL, Director
The Refrigeration
Research Foundation
Berkeley, Calif.

Where authors' copyrights are not involved, CI is always glad to grant permission to reprint articles for private use.—ED.

Teflon Not a War Baby

To the Editor of Chemical Industries:

We notice in the October, 1948, issue of your journal on page 586 a note on the development and production of fluorine-containing polymers. We believe, generally, that this is a timely news item but would like to correct the statement that "Teflon" tetrafluoroethylene resin was developed in connection with Government projects during the war. This was not the case; this polymer was already in production before the war started and the development work was all done independently of any Government projects.

A. F. BENNING
Jackson Laboratory
E. I. du Pont de Nemours & Co.
Wilmington, Delaware

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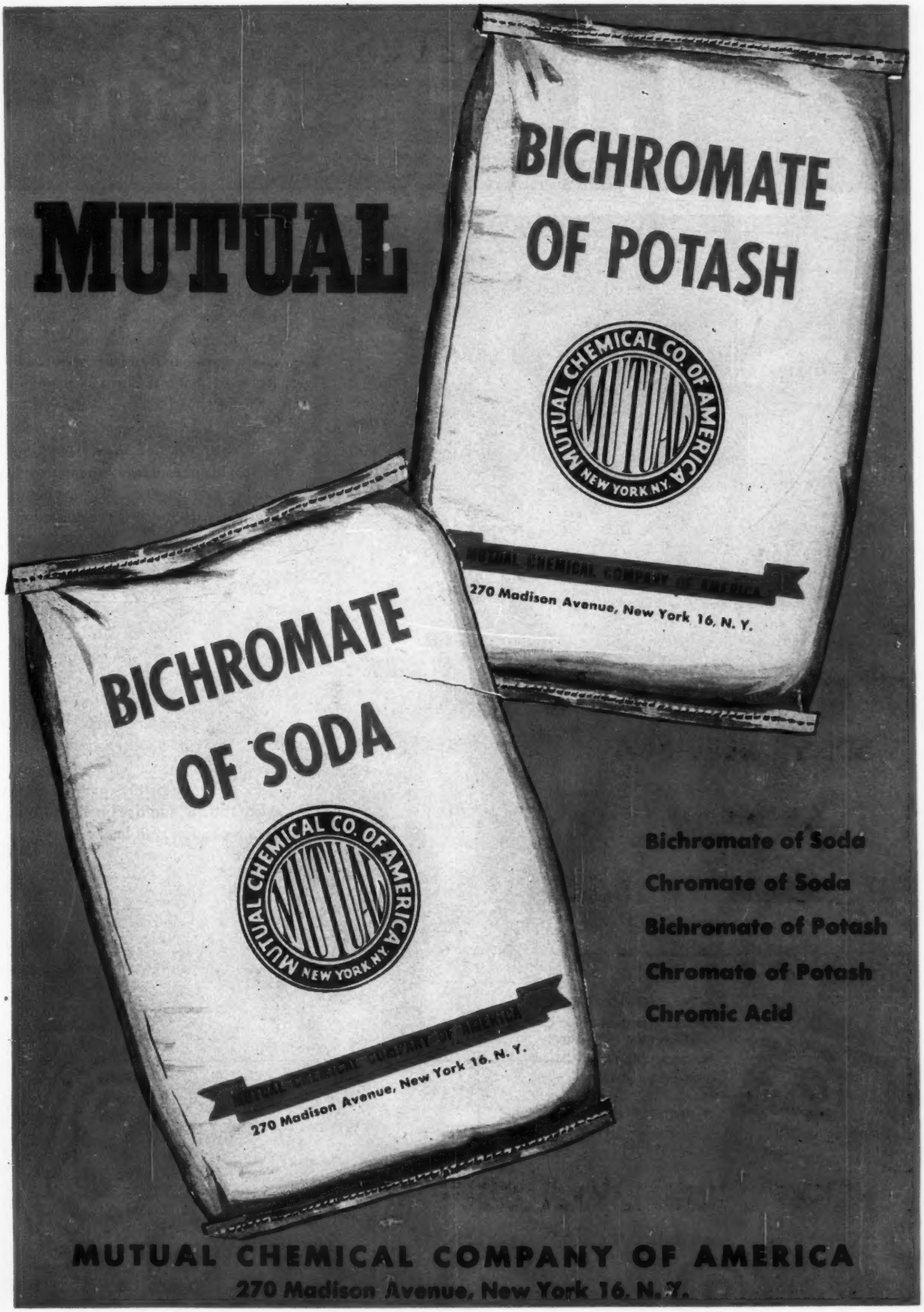
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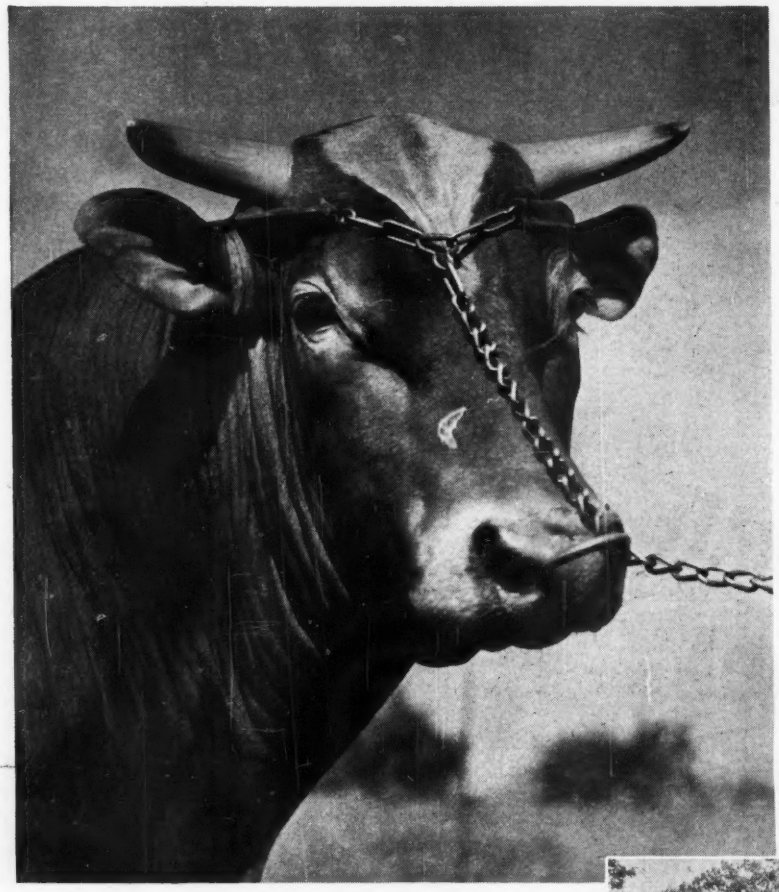
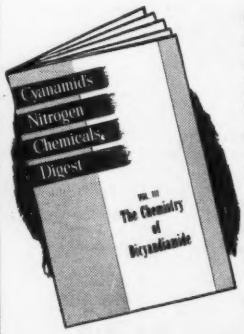
Life ...on the



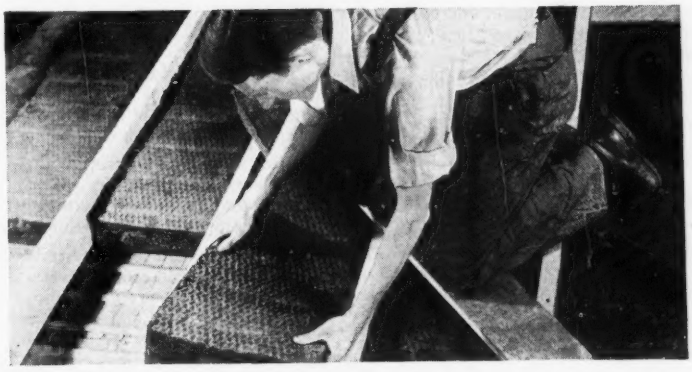
GOOD FEEDING is a matter of good soil from which the feed must come. That's why phosphorous-rich soils produce better crops and provide better pastures to nourish animals. And to make available in the soil a continuous supply of phosphorous in its most natural form, Cyanamid's AERO-PHOS* Florida Natural Phosphate is used. One application mixed with, or spread over the soil, continues to provide phosphorous to increase the quality and quantity of crops for several years. Hence it is recognized as a long-term soil-builder.

HEAVY WORK requires heavy-duty motors, lubricated by heavy-duty oils. To "fit the oil to the job", Cyanamid has developed a complete line of AEROLUBE* additives, each specially adapted to give the oil the specific qualities required of it as a motor lubricant. Oil stability, engine cleanliness and inhibition of bearing corrosion are three of the qualities which AEROLUBE additives bring to regular, premium and heavy duty motor oils.



AERO† DICYANDIAMIDE has long been an important tool in chemical synthesis. Vol. III of Cyanamid's Nitrogen Chemicals Digest has been prepared as a handy reference booklet covering the physical properties, chemical reactions and suggested uses of this valuable intermediate. This booklet will be an asset to any library on nitrogen chemistry. All information is tabulated in convenient form. Just fill in and return the coupon opposite to receive a free copy of this new booklet.

Chemical Newsfront



STEARATES PLAY A PART in many diverse manufacturing processes — to facilitate the process itself or to produce a better product. Hence, uniformity and purity of stearates can be a big factor in determining the quality of the finished product.

That lead pencil in the little girl's hand *(at left)*, as well as the paint used on the globe beside her and the varnish on her highchair . . . the rockwool "bat" which the worker in the second picture is laying . . . the powder on milady's face, the plastic appointments on her dressing table—the manufacture of each of these probably incorporates one or another of the metallic soaps to improve the finished products.

Because Cyanamid's AERO† Brand Metallic Soaps are produced in extremely small, uniform particles, they are ideally suited to modern manufacturing methods. Indeed, many new uses lie ahead for these versatile materials, particularly where lubrication, water-proofing, suspension, dispersion, flatting and gelling are factors.

*Reg. U. S. Pat. Off. †Trade Mark

WRITE FOR LITERATURE. If you would like further information on products mentioned, check off below and mail.

- ☐ AERO-PHOS Florida Natural Phosphate
- ☐ AEROLUBE Additives
- ☐ AERO Brand Metallic Soaps
- ☐ Dicyandiamide Booklet

Name_____

Company_____

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C. I. 1-49

AMERICAN Cyanamid COMPANY

30 ROCKEFELLER PLAZA · NEW YORK 20, N. Y.

by Dr. M. R. McCorkle, Use Research and Development Laboratory, Armour and Company

Fatty Amides: THEIR PROPERTIES AND THEIR USES

A primary amide may be described as a derivative of an organic acid in which the (OH) group has been replaced by an amino (NH_2) group. This forms a substantially neutral chemical called an amide ($RCONH_2$).

The name "Armid" is the Armour trade-name given to the general class of amides derived from fatty acids. Since fatty acids are all straight-chained molecules, the Armids are likewise straight-chained.

General Properties

These high molecular weight amides are high-melting, wax-like materials. The chemically pure amides are water-insoluble and neutral. Commercially, the Armids may contain a few percent of the unreacted fatty acids from which they are made.

The Armids vary in physical properties from a substance which can be flaked like stearic acid to a soft paste. The color of the saturated amides is lighter than that which can be obtained on the unsaturated amides.

Solubilities

The Armids are soluble in ketones, esters, alcohols, turpentine, mineral spirits, fats and fatty acids. They are not soluble in water.

In general, amides are insoluble or only slightly soluble in organic solvents at room temperature, and increase in solubility at high temperatures.

In the saturated series the longer the carbon chain of the amide, the less is the solubility. In each class of solvents, the higher the molecular weight of the solvent, the more amide it will hold in solution.

Chemical Properties

Unsubstituted amides react with ethylene oxide to yield mixtures of mono- and di-substituted amides (available commercially from Armour Chemical Division as "Ethomids") which range from dispersible solids to soluble waxes. Suitable choice of amounts of ethylene oxide give good wetting agents and excellent cotton detergents when properly formulated.

Reactions of amides with formaldehyde, depending on the conditions, may give methylol stearamide or methylene bis stearamide (Armowax). Methylol stearamide undergoes a number of interesting reactions leading to textile waterproofants, surface-active agents and high-melting waxes.

Amides may be chlorinated by reaction with a sodium hypochlorite. These compounds offer many interesting possibilities for further synthesis of wetting agents, textile softeners, waterproofing agents, detergents, etc.

Availability

The Armids which are available in quantity for commercial use are shown below in tabular form, together with their average composition and constants.

Technical information, samples and prices are available upon request. (Any indication of your particular field of interest will be helpful to our Technical Service Department in making recommendations.)

High Molecular Weight Aliphatic Amides—Composition and Constants Chart

n-Primary Amides	Carbon Chain Length	Armid 8	Armid 10	Armid 12	Armid 14	Armid 16	Armid 18	Armid HT	Armid RO	Armid T	Armid TO	Armid C
Hexane	6	3	..	..	..	..	..	..	..	..	..	..
Octane	8	90	3	..	..	..	..	..	..	..	..	8
Decane	10	7	90	..	..	..	..	..	..	..	..	9
Dodecane	12	..	7	90	4	..	..	..	..	..	..	47
Tetradecane	14	..	..	9	90	..	..	..	..	..	..	18
Hexadecane	16	..	..	..	4	90	6	25	..	30	..	8
Octadecane	18	..	..	..	..	6	93	70	20	25	..	5
Octadecene	18	..	..	1	2	4	1	5	60	45	30	5
Octadecadiene	18	..	..	..	..	..	..	..	20	..	30	..
Substituted Cyclic	20	..	..	..	..	..	..	..	..	..	40	..
Approximate Melt Point °C		97	97	97	97	97	100	98	72	80	55	90
Approximate % Unreacted Fatty Acid		5	5	5	5	5	5	5	5	5	5	5

Commercial Applications

Plastic Anti-Blocks: The Armids are used in quantities up to 5% as anti-blocking agents in plastic formulations. Typical resins are vinyls, ethyl cellulose, methacrylates.

Emulsion Additives: Generally, the Armids either thicken, stabilize or increase spreadability of an emulsion when added to the extent of 1-5% on the basis of the oil phase to be emulsified.

Mutual Solvents: The Armids make many synthetic resins compatible with paraffin or microcrystalline waxes — make possible a wide range of unique compounds with certain of the desirable properties of both plastics and waxes.

Printing Inks: Armids are effective anti-offset, anti-scratch agents for use in printing inks, and unlike most materials, allow overprinting by another color.

Dye Solubilizers: Certain of the Armids have been found to hold more of certain dyes than castor oil, thus giving both increased dye solubility and anti-stick qualities to carbon paper, for example.

Chemical Raw Materials: The Armids are a starting point for the synthesis of such products as high-melting waxes, synthetic detergents, waterproofing agents, and many others.

.....

Please send a copy of the technical bulletin, "Armids (High-Melting Organic Chemicals)" to:

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PAINTS AND VARNISHES

Pine oils are used in the paint and varnish making industries as special solvents in alkyd and phenolic resin formulations, as wetting agents and levelers for baked enamels, dispersants for grinding pigments, and as anti-skinning agents. Pine oil is also used as a preservative, wetting agent, and anti-foam agent in casein—and water-emulsion paints.

DISINFECTANTS

High in terpene alcohol content, Hercules Pine Oils are widely used in disinfectants. They are effective, low in cost, safe and easy to use, have a pleasing piney fragrance, long-lasting disinfectant action, do not stain.

MINING

In the mining industry, Hercules Pine Oils are used as frothing reagents in the flotation process. Low in cost, pine oils are effective frothers for the flotation of sulphide minerals—especially where a highly mineralized froth is required. Pine oils are also employed in the flotation of coal, potassium chloride, and talc.

PAPER

Pine oils diverse properties are responsible for their wide acceptance in the paper industry. They are used as anti-frothers, casein preservers, and as wetters and spreaders in coating operations.

HERCULES

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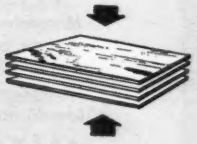

PLYWOOD ADHESIVES

Pine oils are used as anti-foaming agents, wetting agents, and protein preservatives in plywood adhesives. They perform a similar function in adhesives based on glue, casein, and starch.

YOUR INDUSTRY

Hercules Pine Oils have application in many other industries, such as the textile, soap, cleaners, drug, leather, rubber, and laundry industries. Possibly pine oils have new and desirable applications in your industry? Why not send for literature and testing sample?

HERCULES POWDER COMPANY
INCORPORATED
992 Market Street, Wilmington 99, Delaware

Please send me information and testing samples of pine oils for evaluation in_____

NAME_____

TITLE_____

COMPANY_____

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HERCULES

FOR YOUR INFORMATION

New Monsanto products mean progress for your business

Among the 25 new Monsanto chemicals described here, you are likely to find one or more that can be profitably applied to your business—now, or later.

For your convenience, each of these Monsanto products is described briefly in terms of suggested uses, properties and availability . . . Also, each product is numbered (B-1, B-2, etc.) for easy identification and reference in asking for further information—either by letter or by simply ringing the appropriate numbers on the coupon on opposite page.

Your request will receive prompt attention—whether it applies to any of the new products listed here, or to any other Monsanto chemicals that may help reduce your production costs, improve product performance and sales.

Detergent MXP

Suggested Uses: In metal cleaning, mechanical dishwashing, dairy and shop cleaning compounds, reclamation of rags and waste, for rendering alkaline detergent powders non-dusty, pressure jet cleaning.

Properties: An industrial detergent comprising a balanced mixture of non-ionic active principal with synergistic alkaline builders possessing superior detergency with minimum sudsing.

Availability: Commercial quantities. (B-1)

Dichlorophthalic Anhydride

$C_6H_2Cl_2(CO)_2O$ Mol. wt., 217.0

Suggested Uses: Preparation of alkyd resins, plasticizers and other modified phthalate derivatives.

Properties: Practically white flakes consisting of a mixture of isomers; b.p., about 220° C. (40 mm.); m.p. range, 80–140° C.

Availability: Semi-commercial quantities. (B-2)

3,4-Dimethoxybenzyl Alcohol

$(CH_3O)_2C_6H_3CH_2OH$ Mol. wt., 168.2

Suggested Uses: Preparation of aromatic products and as an intermediate for synthesis.

Properties: Practically colorless, water-soluble liquid; b.p., about 174° C. (15 mm.); crystallizing point, approximately 22° C.; Sp. G., 1.17 at 25°/25° C.

Availability: Semi-commercial quantities. (B-3)

3,4-Dimethoxyphenylacetic Acid

$(CH_3O)_2C_6H_3CH_2CO_2H$ Mol. wt., 196.2

Suggested Use: As an intermediate for synthesis.

Properties: White, microcrystalline solid; m.p., 98–99° C; very slightly soluble in cold water, moderately soluble in hot.

Availability: Semi-commercial quantities. (B-4)

3,4-Dimethoxyphenylacetonitrile

$(CH_3O)_2C_6H_3CH_2CN$ Mol. wt., 177.2

Suggested Use: As an intermediate in chemical synthesis.

Properties: Nearly white, crystalline solid; cr. pt., 64–65° C.

Availability: Semi-commercial quantities. (B-5)

beta-3,4-Dimethoxyphenylethylamine

$(CH_3O)_2C_6H_3CH_2CH_2NH_2$ Mol. wt., 181.2

Suggested Use: As an intermediate for synthesis.

Properties: Colorless to pale yellow liquid; b.p., about 156° C. (10 mm.); cr. pt., approximately 15° C.; Sp. G., 1.08 at 28°/4° C. Undergoes all the reactions characteristic of primary amines.

Availability: Semi-commercial quantities. (B-6)

N,N-Dimethylcarbamyl Chloride

$(CH_3)_2NCOCl$ Mol. wt., 107.5

Suggested Uses: As acylating agent in Friedel-Craft reactions involving acid chloride-type reactions, and as esterifying agent to form carbamates and ureas.

Properties: Colorless liquid, strong-smelling lachrymator; b.p., 167° C.; m.p., minus 33° C.; Sp. G., 20°/4°, 1.678; refractive index at 22° C., 1.45196. Soluble in ether, carbon bisulfide, benzene.

Availability: Laboratory quantities. (B-7)

Methylcyclohexylammonium N,N-methylcyclohexyldithiocarbamate

$CH_3(C_6H_{11})$ N.CS.SH.HN(C_6H_{11}) CH_3
Mol. wt., 302.0

Suggested Uses: Vulcanization accelerator for rubber and rubber latex.

Properties: Color, pale straw-yellow crystals; m.p., 120-123° C.; Sp. G., 1.115; sol. in water, 2.2% at 25° C., very soluble in acetone, methyl-, ethyl-, isopropyl alcohol, ethyl acetate, benzene, chloroform and carbon tetrachloride; slightly soluble in water; insoluble or very slightly soluble in heptane.

Availability: Experimental quantities. (B-8)

Nifos*-T

Suggested Uses: Insecticide and rodenticide.

Properties: Commercial product containing as chief active ingredient 40% tetraethyl pyrophosphate, $(C_2H_5O)_4P_2O_3$, mol. wt., 290.2. Straw to brown-colored liquid; Sp. G., 1.19 at 25°/25° C. or 10.0 lbs./gal. Highly effective against insects and mites at low concentrations. Miscible with water, aromatic and polar solvents: immiscible with paraffinic solvents. In the presence of moisture, Nifos-T hydrolyzes to relatively non-toxic, water-soluble products, avoiding problems of toxic residues. May be applied as spray, dust or aerosol. Toxic to animals but relatively non-toxic to most plants at working concentrations.

Availability: Commercial quantities. (B-

Niran* brand of Parathion (O,O-diethyl O-p-nitrophenyl thiophosphate)

$(C_2H_5O)_2PSOC_6H_4NO_2$ Mol. wt., 291.3

Suggested Use: Insecticide.

Properties: Dark brown liquid: Sp. G. 1.27 at 25°/25° C. or 10.6 lbs./gal. Insecticide of high activity against a very wide variety of insects and mites. Miscible with aromatic and polar solvents; only slightly miscible in paraffinic solvents and water. Relatively non-corrosive to metals of construction and containers. Applied as spray, dust, dust suspension or aerosol. Toxic to animals. Low plant toxicity.

Availability: Semi-commercial quantities. (B-10)

beta-Phenylethylamine

$C_6H_5CH_2CH_2NH_2$ Mol. wt., 121.2

Suggested Uses: As an intermediate for chemical synthesis and as a precursor in penicillin manufacture.

Properties: Colorless to slightly yellow liquid; b.p., about 200° C. (760 mm.); Sp. G., 0.96–0.97 at 15.5°/15.5° C. Undergoes all the reactions characteristic of primary amines; may be used as a liquid or in the form of the acetate or hydrochloride in aqueous solution.

Availability: Commercial quantities. (B-

Di-*beta*-phenylethylamine

$(C_6H_5CH_2CH_2)_2NH$ Mol. wt., 225.3

Suggested Use: Intermediate for chemical synthesis.

Properties: Colorless to slightly yellow liquid: Sp. G., 1.00 at 25°/25° C.; b.p., approximately 204° C. (22 mm.).

Availability: Research quantities. (B-12

News of Monsanto Chemicals for the Process Industries . . . January, 1949

Potassium Phenylacetate (64%)

Suggested Uses: As a penicillin precursor and as a chemical intermediate.

Properties: A 64% aqueous solution of the potassium salt of phenylacetic acid; Sp. Gr., 1.26 at 25°/25° C.; refractive index, 1.477 at 25° C.

Availability: Commercial quantities.(B-13)

Santicizer* 141

Suggested Uses: Designed specifically as a primary plasticizer for polyvinyl chloride and polyvinyl chloride-acetate and suggested for use in coated textiles, free films, tablecloths, shoe soles and floor tiles, as well as in such products made from Buna-N type synthetic rubber as diaphragms, hose and conveyor belting.

Properties: A new, non-volatile plasticizer of the aryl-alkyl type, imparting excellent low-temperature flexibility and flame-proofing qualities to polyvinyl chloride, polyvinyl chloride-acetate and Buna-N type synthetic rubbers. Light-colored liquid with slight odor; b.p., approximately 375° C. (50 mm.), fluid at minus 30° C.; Sp. G., 1.09 at 25° C.; refractive index, 1.51–1.52 at 25°/25° C.

Availability: Commercial quantities.(B-14)

Santicizer 160

Suggested Uses: Textile coatings, plastics, protective coatings and electrical insulation.

Properties: A new, phthalate type plasticizer for polyvinyl chloride, polyvinyl chloride-acetate, polyvinyl butyral, ethyl cellulose and nitrocellulose. Water-white, oily liquid with faint characteristic odor; b.p., approximately 370° C. (760 mm.); glassy at minus 40° C.; Sp. G., 1.12 at 25°/25° C.; refractive index, 1.53–1.54 at 25° C. Has superior permanence, oil resistance, flexibility and stability.

Availability: Commercial quantities.(B-15)

Santodex*

Suggested Use: Designed specifically to improve the viscosity index of lubricating oils.

Properties: All-hydrocarbon, viscous, light-colored oil additive. Typical inspection data are: Sp. G., 0.899 at 60°/60° F.; viscosity, 1,000 S.U.S. at 100° F., 1,900 S.U.S. at 210° F.; flash point, 350° F.

Availability: Commercial quantities. (B-16)

Santophen* 1

(*ortho*-Benzyl-*para*-chlorophenol)

$C_6H_5CH_2C_6H_3ClOH$ Mol. wt., 218.6

Suggested Uses: Germicide and general disinfectant.

Properties: Nearly colorless, dry, non-caking flaked solid; faint, pleasant phenolic odor; m.p., approx. 49° C.; cr. pt., 45.0–45.5° C.; refractive index @ 55° C., 1.591–1.592; Sp. G., 1.203–1.206 at 60°/25° C.; b.p., approx. 175° C. @ 4 mm.; free bulking density, approx. 30.5 lbs./cu. ft. Possessing a unique combination of properties desired in a germicide, Santophen 1 is highly toxic to bacteria and fungi, convenient to formulate and safe to use. Specific applications include sanitizing rest rooms; sterilizing floors, walls and equipment in hospitals; deodorizing garbage cans; disinfecting poultry and livestock shelters; treating locker room floors and premises of swimming pools for control of athlete's foot. Solubilized with alkali, Santophen 1 is not considered corrosive to most metals or other engineering materials. Therefore, its formulations, particularly with soaps, are applicable for cold instrument sterilization and for disinfecting metal containers.

Availability: Commercial quantities.(B-17)

Santopoid* 29

Suggested Use: Gear lubricant additive for hypoid and other gears.

Properties: Amber, viscous oil additive; Sp. G., 1.09 at 60°/60° F.; flash point, 295° F.; pour point, 45° F.; viscosity, 268 S.U.S. at 100° F., 48 S.U.S. at 210° F. Designed to provide in a single gear lubricant the performance characteristics necessary for lubricating hypoid and other gears under the diverse conditions of high-speed passenger car, heavy-duty truck, bus and tractor-trailer service.

Availability: Commercial quantities.(B-18)

Santovar* S

Suggested Uses: Rubber antioxidant for white and light-colored articles.

Properties: An alkylated polyhydroxy phenol, M.W., 318.0; Sp. G., ca. 1.10; soluble in ethanol, ether, dioxane, benzene and carbon tetrachloride. Color, clear, amber to orange resin.

Availability: Commercial quantities.(B-19)

Santowhite*

Suggested Uses: Rubber antioxidant for white and light-colored articles.

Properties: Dialkyl phenol sulfide; M.W., 358.0; Sp. G., 1.097; m.p., 145° min.; color, light gray to light tan powder; soluble in ethanol, acetone, ethyl acetate, ether, hot chloroform, benzene, chlorobenzene and carbon tetrachloride.

Availability: Commercial quantities.(B-20)

Sodium Copper Polyphosphate

Suggested Use: Fungicide for preservation of seeds.

Properties: Complex alkali-heavy-metal phosphate glass; sparingly soluble in water; dense blue powder.

Availability: Laboratory quantities. (B-21)

Sodium Lead Polyphosphate

Suggested Use: Biocide.

Properties: Complex alkali-heavy-metal phosphate glass; sparingly soluble in water; dense white powder.

Availability: Laboratory quantities. (B-22)

Sterox* CD

Suggested Uses: For compounding alkaline, neutral or acid detergent mixtures for industrial cleaners, bottle washing, metal cleaning, dishwashing, dairy and shop cleaning, for rendering alkaline detergent powders non-dusty.

Properties: Non-ionic, slightly basic, powerful detergent fluid of minimum sudsing properties. Viscous liquid weighing approximately nine lbs./gal., which is readily miscible in water, with reduced solubility at elevated temperatures. Compatible and effective in combination with cationic surface-active agents, including quaternary ammonium compounds.

Availability: Commercial quantities.(B-23)

Sterox SE and SK

Suggested Uses: Compounding metal and industrial cleaners, herbicide and germicide emulsions, hand dishwashing compounds, soldering compounds.

Properties: Non-ionic surface-active agents and detergents of high wetting efficiency. Reddish, yellow liquids miscible with a large number of organic solvents; partially soluble in most aliphatic hydrocarbons. Flame and flash point, ASTM open cup, greater than 200° C.

Availability: Pilot plant quantities. (B-24)

2,4,5-Trichlorophenoxyacetic Acid

$C_6H_2Cl_3OCH_2CO_2H$ Mol. wt., 255.5

Suggested Use: Herbicide for control of woody vegetation.

Properties: Light tan solid; m.p., 151–153° C.; insoluble in water, soluble in alcohol; readily forms sodium and alkanol amine salts. Used as the above salts, or in the form of an ester, as an herbicide. Hormone type compound having high plant toxicity.

Availability: Commercial quantities. (B-25)

*Reg. U. S. Pat. Off.

★ ★ ★

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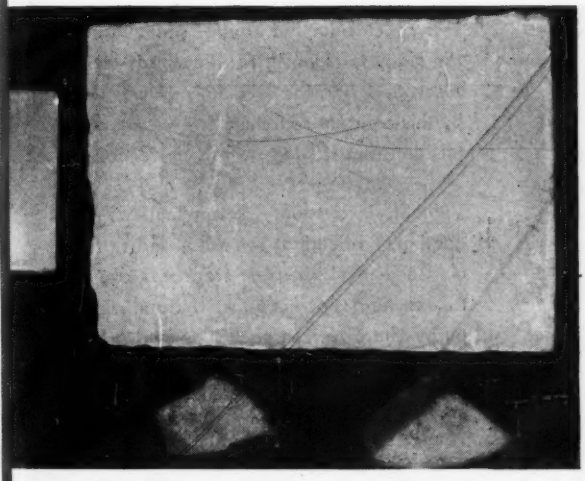

CERESINE WAX—Domestic, White, Yellow, Lemon Yellow and Orange. 10 lb. slabs and 200 lb. bags. Prime quality, with controlled uniformity. M.P. 128-160°F. Soluble in alcohol, benzol, chloroform, naphtha. Used in candles, shoe, floor and leather polishes, anti-fouling paints, toys, impregnating and preserving, rubber mixtures, and many other industrial products and processes.

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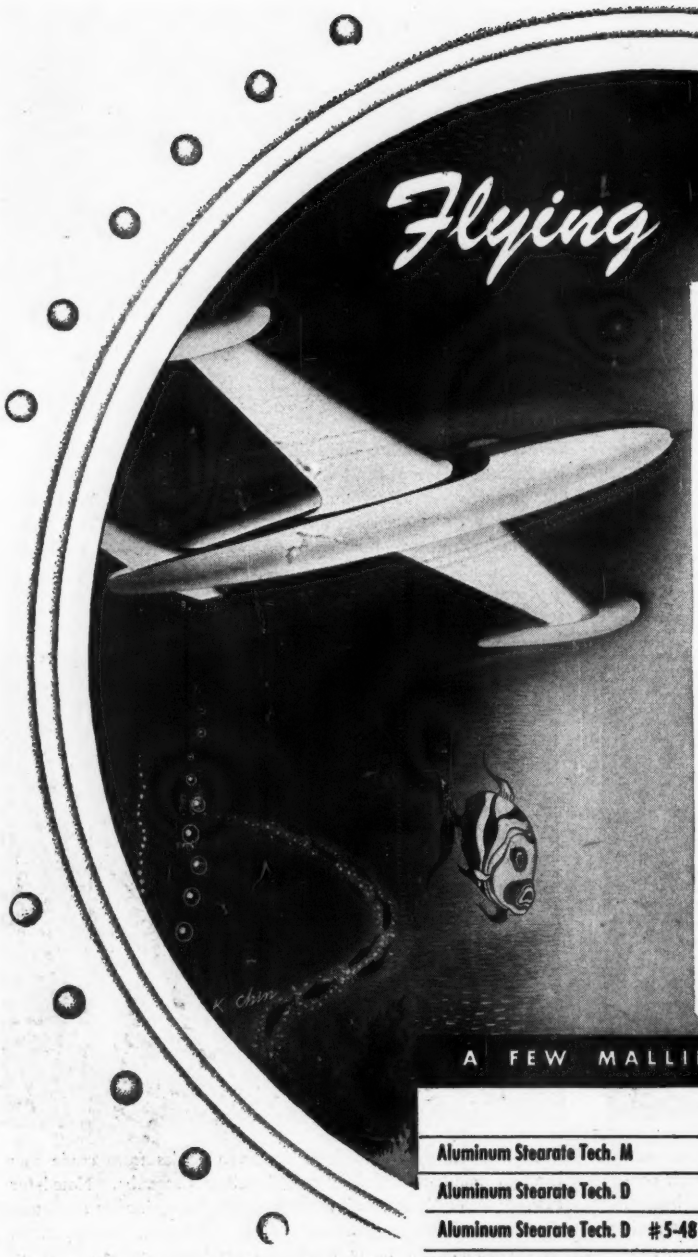

Flying UNDER WATER

Aircraft engineers have actually towed full scale airplanes under water—several fathoms down—in their search for better design and construction. Low speed in water was used to simulate high speed in air. Records automatically made of stresses and strains during the tests located weaknesses in the plane. Genius of the aircraft industry in developing punishing and revealing tests and in building its product to meet them are the foundation of its success.

Less spectacular but equally searching are the many tests which **Mallinckrodt stearates** meet. Superior, too, are the products developed by this constant searching for weakness, this constant striving toward perfection.

Valuable in a variety of applications—gelling, coating, lubricating, releasing and repelling moisture—**Mallinckrodt stearates** are made to exacting specifications. Uniform dependable purity characterizes each type and grade.

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Aluminum Stearate Tech. M	50-55 ft. oz./lb.	14-15%	6.6-7.5%	190-200° C
Aluminum Stearate Tech. D	50-55	8.4-8.7	6-7	155-160
Aluminum Stearate Tech. D #5-48	45-50	8.7-8.9	6-7	155-160
Flatting Agent No. 22	60-65	8.4-8.7	9-10	145-150
Aluminum Stearate Fluffy	60-65	8.4-8.7	6-7	145-150
Aluminum Stearate Tech. TD	85-95	7.5-8.0	12.5-13.5	125-130
Aluminum Stearate Tech. T	60-65	6.0-6.5	24-25	105-110
Ammonium Stearate Tech.	30-35	——	decomposes	decomposes
Calcium Stearate Impalpable Powd. Gr. A	130-150	8.8-9.3	0.5-1.0	145-150
Calcium Stearate Tech. Bulky Gr. A	130-150	8.8-9.3	0.5-2.5	145-150
Magnesium Stearate Impalp. Powd. Gr. A	115-130	7.5-8.0	0.5-1.0	125-130
Sodium Stearate Tech. Grade A	35-40	9.5-10.5	——	175-180
Zinc Stearate Tech.	130-150	13-14	1-2	112-117
Zinc Stearate U.S.P. XIII Grade A	130-150	13-14	1-2	112-117

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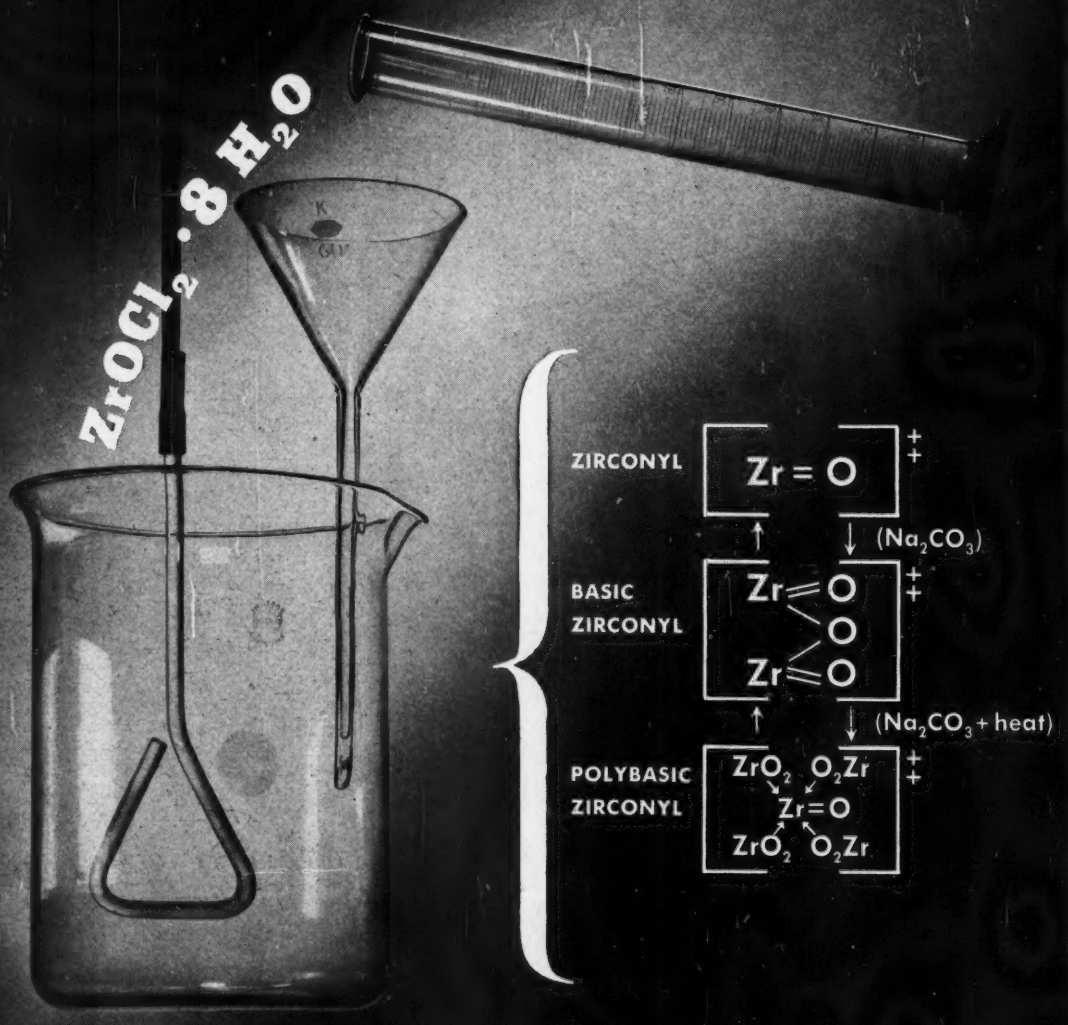
UNUSUAL IONS WITH USEFUL APPLICATIONS



Upon dissolving zirconium oxychloride in water, a number of ionic individuals is obtained. The preponderance of particular ions can be easily controlled by adjusting the temperature and pH of the solution. This permits a surprising number of physical and chemical properties to be realized from this one zirconium salt. These properties have already been successfully exploited in the preparation of a wide variety of chemical products. Many additional uses are in prospect.

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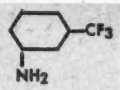
Hooker Acid Chlorides

MEET A WIDE RANGE OF NEEDS

The Hooker Chemicals described below are all acid chlorides. Their properties make them of use in such varied fields as the manufacture of dyestuffs, plasticizers, pharmaceuticals, and lubricants. If you are engaged in any of these fields or in other chemical processing, some of these acid chlorides may make your work easier.

Brief descriptions and some of the uses of these acid chlorides are given below. Technical Data Sheets and samples will be furnished when requested on your letterhead. For more information consult our Technical Staff for help on how Hooker Chemicals may solve your specific problems.

HOOKER RESEARCH PRESENTS
m-AMINOBENZOTRIFLUORIDE



Molecular Weight 161.13
Freezing Point .....3° C
Distillation Range ....5° including 189° C
Specific Gravity, 15.5°/15.5° C 1.303
Refractive Index, n20/D 1.481

Another new fluoride from Hooker Research Laboratories, m-Aminobenzotrifluoride seems destined for wide use as an intermediate in the preparation of dyestuffs. Preliminary investigations also indicate the possibility of further nuclear substitution. The CF_3 group is usually strongly meta directing. However, in this compound indications are that the NH_2 group will have a greater directing influence than the CF_3 group. Further substitution will very likely be in the position ortho to CF_3 and para to NH_2.

The CF_3 group is chemically stable but in the NH_2 group one or both hydrogens may be substituted.

m-Aminobenzotrifluoride is a colorless liquid with a characteristic aniline like odor. It turns brown when exposed to light. At present it is available in pilot plant quantities. Technical Date Sheet 366 describes its physical and chemical characteristics fully and gives literature references. When requesting literature or samples, please use company letterhead.

PRODUCT *Chemical Formula and Molecular Weight*	*DESCRIPTION AND USES*
METANITROBENZOYL CHLORIDE $NO_2C_6H_4COCl$;185.5	Yellow to brown liquid partially crystallized at room temperature. Last crystal point 28° to 31° C. Manufacture of dyes for fabrics and color photography; intermediate in preparation of pharmaceuticals.
PARANITROBENZOYL CHLORIDE $NO_2C_6H_4COCl$;185.5	Yellow crystalline solid. M.P. 70° C minimum. Manufacture of novocaine, procaine hydrochloride; dyestuffs.
ACETYL CHLORIDE CH_3COCl;78.5	Clear, colorless to pale yellow liquid. Dist. R. 2.5° incl. 51° C. To introduce acetyl group into organic compounds. Manufacture of intermediates, dyes, and pharmaceuticals.
BENZOYL CHLORIDE C_6H_5COCl;140.5	Clear, colorless liquid. Boiling point 198° C. As a highly reactive acid chloride, it may be used to introduce the benzoyl group into organic compounds, especially through Friedel-Crafts reactions. It is used in the manufacture of synthetic perfumes, pharmaceuticals, dyes and resins.
PHOSGENE (CARBONYL CHLORIDE) $COCl_2$;98.9	Liquified gas. F. P. — 126° C., B.P. 8.2° C Manufacture alkyl and aryl chlorocarbonates and dialkylcarbonates; Michler's ketone; dye intermediates; metal chlorides and anhydrides; pharmaceuticals; perfumes.
SULFURYL CHLORIDE SO_2Cl_2;135.0	Light yellow liquid. B. R. 2° incl. 69.5° C. Reacts with organic acids to form other chlorides and anhydrides. Chlorinating agent for chlorophenol and other chlorination reactions in organic synthesis.
THIONYL CHLORIDE $SOCl_2$;119.0	Clear, pale yellow to red liquid. B.R., refined grade, 75° to 78° C. Manufacture of organic acid chlorides and anhydrides, alkyl chlorides from corresponding alcohols. It may be used to introduce sulfur alone or in combination with oxygen.

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3 WIDELY USED Baker COMPOUNDS

Each one of Baker's Molybdates has a specific use, but all three have this in common—physical and chemical uniformity according to its degree of purity. The name Baker is your assurance of this dependability.

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This compound is popular with the ink and color industry for producing permanent tones and pigments because it is manufactured with controlled optimum pH. Its high assay of contained Molybdenum, its low cost for contained Molybdenum, and its convenient use for batches of any size, are three important advantages.

AMMONIUM MOLYBDATE, C. P. Fine Crystal, 81–81½% MoO_3

This chemical is made to a high and very uniform standard of chemical purity to serve as a catalytic raw material. Batch after batch will be found to have the same exact degree of purity—a factor so necessary with catalytic agents. One important use is for the manufacture of Formaldehyde.

AMMONIUM MOLYBDATE, C. P. Special

Manufacturers of radio tubes, and other products where molybdenum filaments are required, appreciate the extreme purity of Baker's Ammonium Molybdate, C. P. Special. It has wide acceptance for metal reduction purposes.

Samples and prices on any one or all three Molybdates will be gladly forwarded upon request. Address your letter direct to J. T. BAKER CHEMICAL CO., *Executive Offices*, Phillipsburg, N. J.

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Catalog K — The encyclopedia of Durco corrosive-handling equipment. Describes 36 types of Durco products including pumps, pipe, valves, heat exchangers and other acid-handling equipment. Gives the features of each type, also sizes, capacities, and the Durco alloys in which it is made.

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DURCO Adv. 76-CM

Chemical Industries

THE MAGAZINE OF THE CHEMICAL PROCESS INDUSTRIES

CI Newsletter,
January, 1949

For Your Information:

Ashtabula, Ohio, will be the location of the new $10-million chlorine and metallic sodium plant to be built under a Du Pont license by National Distillers Products Corp. The plant will have an annual capacity of 54 million pounds of chlorine and 36 million pounds of sodium. National Distillers plans to sell all of its output of both products, has no current plans to manufacture derivatives.

A new silica coating for the inside of "frosted" incandescent lamps, which is said to give almost perfect diffusion of light, is now in the pilot-plant stage at General Electric Co. It is applied over the conventional frosting that is achieved by etching of the glass itself.

* * CI * *

International Minerals & Chemical Corp.'s million-dollar plant at Carlsbad, N. M., to produce refined potassium chloride and potassium sulfate will go into operation next month. For sometime in the future the company is considering an electrolytic caustic potash plant that would utilize refined chloride as raw material.

Instant-curl preparations, the current bonanza for specialties manufacturers, are still shrouded in a fog of litigation over trade-name rights. Most of them, however, contain the same basic ingredients: citric acid and ferrous or ferric salts (usually the sulfate). The citric acid tends to "harden" the hair, thus magnifying and stabilizing the curl. Iron salts, in theory, can combine with protein to give a complex, much as does a tanning agent with leather.

* * CI * *

Fulfilling expectations (CI Newsletter, September 1947), Jefferson Chemical Co. is pushing field investigation of several thianaphthenes and chlorothiophenes that show promise as intermediates for dyes, pharmaceuticals, rubber chemicals and similar organics. The materials are being produced on a pre-pilot plant

scale. The thiophene nucleus is relatively unexploited from a commercial standpoint. Compounds in the testing program that seem to have the broadest possibilities are 2-chlorothiophene, 2,5-dichlorothiophene and 3-acetylthianaphthene.

* * CI * *

American Cyanamid Co. has signed an agreement with Montecatini (Montecatini Societa Generale Per L'Industria Mineraria E Chimica) of Milan, Italy's largest chemical company, providing for exchange of information and patent rights relating to dyestuffs, pigments, and a few textile and rubber chemicals.

There is a close parallel in the interests of the two companies—nitrogenous and phosphate fertilizers, agricultural chemicals, coal tar derivatives, pigments, resins, pharmaceuticals, and specialty chemicals—so it is expected that the agreement, now limited in scope, may be extended. Among the stipulations is the right of each party to use within its respective "zone of influence"—United States-Canada and Italy, respectively—present and future patents of the other party.

A pilot plant of substantial size for non-catalytic thermal cracking of hydrocarbons to ethylene is now being operated by Universal Oil Products Co. It is believed—though not definitely stated—that ethane is a suitable raw material and that the ethylene is recovered by Hypersorption.

* * CI * *

Here and There:

Research at the University of Wisconsin shows that a combination of xylol and Stoddard solvent is a good selective herbicide for cranberries. Both laboratory and field tests have given excellent results, but it appears that effectiveness of the mixture depends on the proportion of the various xylol isomers present....Consolidated Chemical Industries, Inc., is building a new alum plant at Springhill, La....Interest of Monsanto Chemical Co. in the silicone field is evidenced by the entry of its English subsidiary, Monsanto Chemicals, Ltd., into the field through purchase of Silicon (Organic) Developments, Ltd. The newly acquired company is a small organization specializing at present in the development of silicate esters. It also manufactures silicones and is developing a new, cheaper means of production.

Recent commercialization of synthetic glycerin (CI, September 1948, p. 374) lends added interest to a new patent (U. S. No. 2,451,333) issued to Du Pont: formaldehyde, carbon monoxide and hydrogen yield glycerin when they are heated under pressure in the presence of a cobalt oxide catalyst....Another Du Pont patent (No. 2,448,641) employs an alkali metal catalyst for side-chain alkylation of cyclic hydrocarbons with olefins.

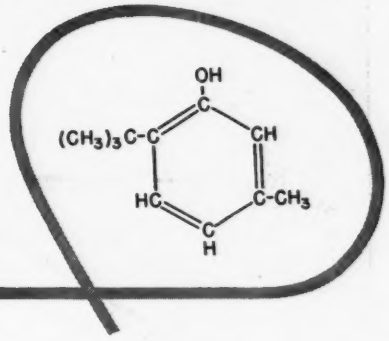
The Editors

KOPPERS

MBMC

Mono-tert-butyl-meta-cresol

A NOVEL COMPOUND FOR COMMERCIAL USE



● Mono-tert-butyl-meta-cresol is a clear, liquid alkylated phenol which solidifies at temperatures slightly below room temperature. In this compound, two of the normally reactive nuclear positions are unsubstituted and can enter into reactions typical of phenol.

MBMC is useful in the following fields:

GERMICIDES and DISINFECTANTS

MBMC has a phenol coefficient of 30-50 as measured against E. typhi and Staph. aureus. The compound is useful for formulation into highly effective disinfectants.

RUBBER CHEMICALS

Sulfide and disulfide derivatives of MBMC are useful as anti-oxidants and rubber processing chemicals.

PETROLEUM CHEMICALS

Thiophosphoric esters of MBMC are of interest as additives to premium-grade lubricating oils.

SYNTHETIC RESINS

MBMC can be employed in the production of oil-soluble phenolic resins useful in surface-coating compositions and for the modification of phenolic molding materials.

PERFUMES

MBMC is an excellent raw material for the production of musk ambrette. The MBMC is first nitrated and then etherified to yield the desired product.

For detailed information on Koppers MBMC, or samples for experimental use, send the handy coupon.

Physical Properties of pure MBMC

Form	Clear liquid
Empirical Formula	$C_{11}H_{16}O$
Freezing Point	21.3°C
Boiling Point	244°C
Specific Gravity—80°C	0.922

Soluble in common organic solvents and aqueous potassium hydroxide.

Koppers Company, Inc.
Chemical Division, Dept. CI1
Pittsburgh 19, Pa.

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- ☐ Information on Mono-tert-butyl-meta-cresol
- ☐ Copy of Bulletin C-8-103, Products of the Chemical Division

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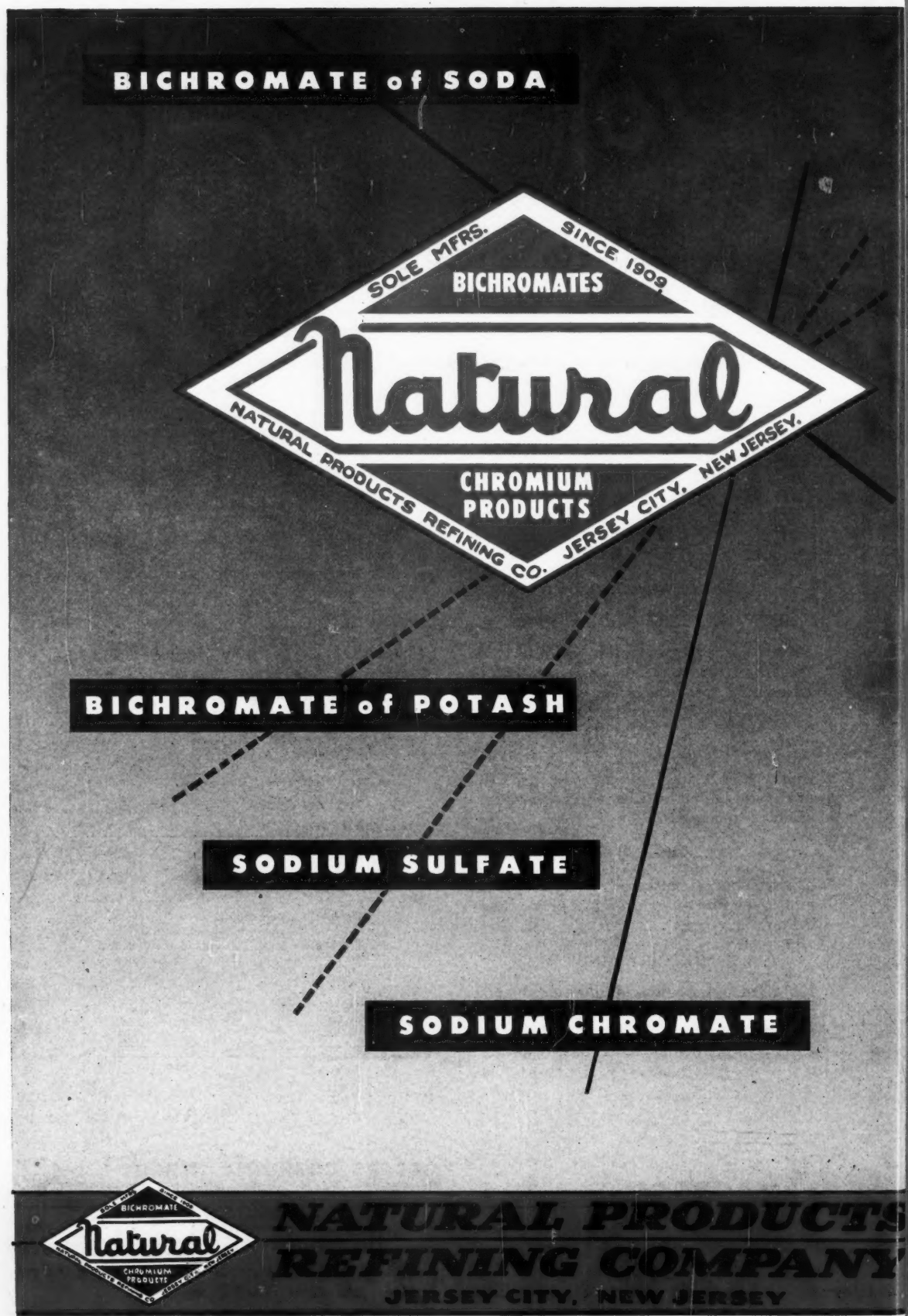
Chemical Division

Pittsburgh 19, Pa.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PRIVATE AID FOR THE ATOM?

by ***ROBERT L. TAYLOR, Editor***

How to give the atomic energy program a booster shot of old fashioned American-brand competitive energy is causing some furrowing of brows on both the government and industry sides of the atomic fence.

Despite famed atom-planner Bernard M. Baruch's admonition that he would hate to see "any private company, anywhere in the world, owning an atomic energy plant," Atomic Energy Commission chairman David Lilienthal wishes he could find a way of injecting the profit-motive stimulus into the fission business. Private contractors operating AEC plants and laboratories likewise wish they could see something more than prestige and a management fee coming out of the time and personnel they are investing in the program.

One attempt at some specific suggestions came last month from the AEC's industrial advisory group, whose chairman is James W. Parker, president of Detroit Edison Co.

In a plain-talking report, the group makes clear its opinion that the atomic energy program is suffering from confinement and lack of "energetic attack by many competing firms and individuals." It places the blame for this on the heavy curtain of secrecy surrounding almost all phases of the project. "No one can say," it claims, "whether the prospect of profits exists, because under present conditions the great majority in industry know little or nothing about the subject."

To give the competitive needle to atomic development, the advisory group recommends that:

1. Government do a better job of issuing reports intelligible to industry.
2. Relax the secrecy ban to the extent of declassifying more information likely to be of help from an industrial standpoint.
3. Permit properly cleared representatives of qualified industries to have first-hand personal contact with AEC work.
4. Set up a permanent general industrial advisory committee for the AEC, and supplement this with special subcommittees to advise on specific problems.
5. Clarify contractual relationships between AEC and engineer- and operator-contractors, and liberalize the patent provisions to stimulate more creative effort by industry.

Adoption of these recommendations, the advisory group believes, would encourage private participation in the development of atomic energy without jeopardizing security.

Undoubtedly they would stimulate industrial interest. But we wonder if they are enough to overcome some other factors that would seem to have more fundamental bearing on industry's reluctance to take the atomic plunge.

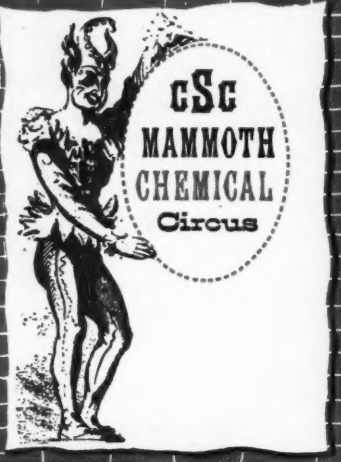
One of these is that nuclear fission as a business proposition is a tremendously long shot. Companies operating AEC plants and laboratories admit privately that they can see no possibility of industrial utilization of atomic energy for at least twenty years. Even then, the potential scale of such utilization is hazy.

Another point is that the price of a ticket in the atomic sweepstakes is well beyond the reach of all but a handful of the country's biggest industrial corporations. Estimates of the cost of a power pile plus all accessories range in the neighborhood of $50 million. Even for a General Electric or a Du Pont this would mean putting a huge share of the company's research eggs under one hen, with a probable incubation period three or four times as long as that of the average research project.

Thus, even if more knowledge and know-how are made available, it appears that the only possible way for private industry to get into the atomic swim on the scale required is through some form of cooperative venture.

But even this only leads to still more difficult problems involving questions of patent protection, tax policies, and antitrust laws.

With such a line-up of obstacles confronting it, there is little wonder that industry is cold to suggestions that it invest some of its stockholders' money in the atom. The truth is that the incentive just isn't there. Government can help hasten the time when it is, but such help will have to include more than merely opening the government laboratory doors a little wider.



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THE CHEMICAL OF THE MONTH
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Molecular weight:	230.16 (calc.)
Density at 25°C:	0.8535 g/ml (7.12 lb/gal)
Coefficient of cubical expansion (20°C-30°C):	0.00057 per 1°F 0.00103 per 1°C
Refractive index (n_D at 25°C):	1.4071
Boiling point (760 mm of Mercury):	232.4°C
Latent heat of vaporization (calc.):	13,400 g cal/mole (approx.)
Melting point:	<—70°C
Viscosity at 25°C:	1.601 centipoises
Surface tension at 25°C:	25.8 dynes/cm
Flash point (Tag. open cup):	185°F
Solubility:	Hydrolyzes rapidly in presence of water. Miscible with common organic liquids such as aliphatic alcohols, esters, diacetone, chloroform, carbon tetrachloride, and naphtha.

Specifications

Purity: 98-100% ester by weight
Specific gravity at 25°C/25°C: 0.8550-0.8570
Distillation range at 40 mm of Mercury: 85% shall distill between 135°C and 140°C
Water: No turbidity when 1 volume is mixed with 19 volumes of 60° Bé gasoline at 20°C
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What's new

RAYON OUTPUT ON PLATEAU

ABETTED BY HUGE EXPANSION in tire yarn, regenerated cellulose fiber capacity has reached new level, double that of prewar.

SYNTHETIC fiber makers have always converted a sizable percentage of their output into cloth. Now, turning about, a textile weaver has become a large manufacturer of rayon fiber.

To buy controlling interest in North American Corp. and American Bemberg Corp. at Elizabethtown, Tenn., from the Department of Justice cost Beaunit Mills, Inc., slightly over $17 million. This purchase marks the latest step of its entry into rayon* spinning. (The acquired stock, somewhat over 50 per cent, had been seized by the Justice Department in August, 1947, under the provisions of the Trading with the Enemy Act.)

Earlier Steps

In addition to the North American-Bemberg purchase, Beaunit is completing a new spinning unit at Coosa Pines, Ala., with a capacity of approximately 10 million pounds a year and in 1945 purchased the controlling interest in the Skenandoa Rayon Corp., believed to have about the same capacity as the Coosa Pines unit. The four units approximate 10 per cent of the country's total annual rayon spinning capacity of about 750 million pounds.

If all capacity of the four units were made available to Beaunit, trade estimates indicate some 30 million pounds of rayon a year above Beaunit's present mill requirements of approximately 40 million pounds. However, the terms of the sale contract continue the yarn allocations to present consumers of North American and Bemberg rayon. According to Beaunit, these extend for five years.

To provide the $17 million required for the North American-Bemberg purchase, Beaunit has arranged a four-year bank loan of $10.5 million and a sale of common stock of nearly $4 million to Lionel Rogosin, son of Beaunit president, I. Rogosin.

Other than Beaunit's Coosa Pines plant, the only recent expansion in rayon capacity is the tire yarn plant of American Enka Corp. at Lowland, Tenn. American Enka is expected to begin construction of new non-tire yarn facilities in the very near future at the same location.

Industrial Rayon Corp.

Industrial Rayon Corp. has announced another plant using its continuous spinning process to be installed near Pt. Pleasant, W. Va. The 1,200-acre site has been purchased, but high construction costs and the softening in demand for rayon may deter completion of this project. American Viscose Corp. has cancelled early plans for a new unit at Radford, Va.

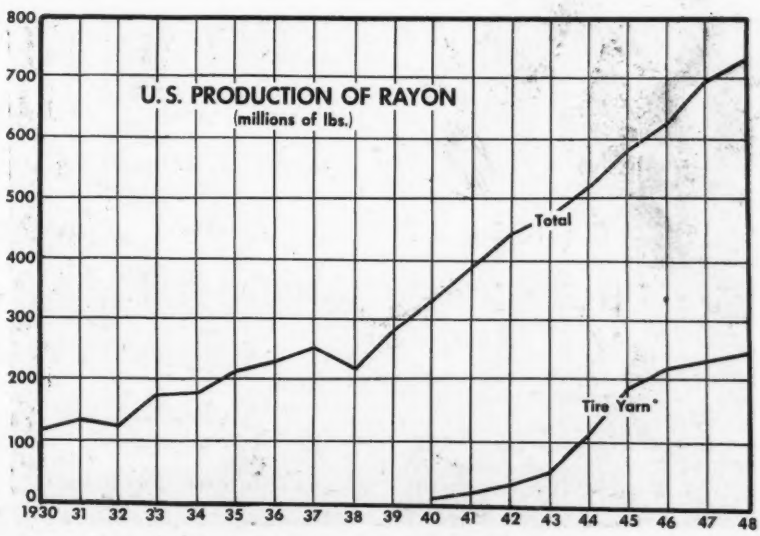
Thus the present capacity figure of nearly 750 million pounds per year promises to stand for several years to come. However, some small expansion can be expected from the addition of capacity-increasing refinements to existing processing units.

Tire Yarn

Most of the recent expansion in rayon plant capacity comes from the almost frantic efforts during the war years to obtain large tonnages of high-tenacity tire yarn. Without the development of rayon tire cord, first announced shortly before the war, the synthetic rubber program might well have foundered. Heat buildup, characteristic of tires fabricated from synthetic rubber and cotton fabric, prevents their long-continued use under high speed for auto tires and under almost any conditions for the jumboes of the tire industry, truck tires.

In a period of less than five years this development has lifted the face of the rayon industry. From a position of comparative insignificance, production of tire yarn mounted to its present peak where it represents nearly a third of the total rayon production. The big expansion in cellulose-based fibers for non-tire fabric production has been in cellulose acetate. Production has more than doubled over prewar.

In spite of high prices for cotton and other fibrous materials, viscose has added but 20 per cent to non-tire fiber capacity. This lends credence to the belief that acetate now enjoys a major advantage such



RAYON OUTPUT: Tires make the difference.

* Following the recommendation of the American Society for Testing Materials, the term *rayon* as used herein refers only to fibers of regenerated cellulose.

as lower production cost or better consumer acceptance.

Dissolving Pulp

Doubled output of regenerated cellulose and cellulose acetate requires twice as much cellulose. Today both linters and wood pulp are used, with the latter holding the lion's share of the market.

But doubled cellulose requirements are the cause of only part of the rayon producers' problems: Much dissolving pulp, wood-derived cellulose, in prewar years came from Sweden and Finland, sources cut off during much of the war. Recently full-scale operations there have been prevented by wood, coal, and chemical shortages.

As a consequence production of rayon pulp in the U. S. now approaches 300,000 tons per year, 50% greater than prewar, yet far short of requirements. The difference is met by imports, primarily from Canada. Too, Canada has greatly expanded its pulp capacity which now nearly equals that of the U. S. Completion of Celanese's huge project on the Canadian West Coast, that of American Viscose at Ketchikan, Alaska, and of the new Southern sulfate pulping mill of the International Paper Co. (*CI., Dec. 1948, p. 941*) should greatly augment these already large production figures.

And Next

Capacitywise, the U. S. rayon industry has reached a new plateau with little new construction in sight unless construction costs decrease and demand increases. At this date, both appear unlikely. Most of the activity will come as the pulp producers of two continents and four countries join battle in supplying the present market.

SCENTS AND DOLLARS

Aerosol deodorants debut in atmosphere fraught with odors and price cutting fears.

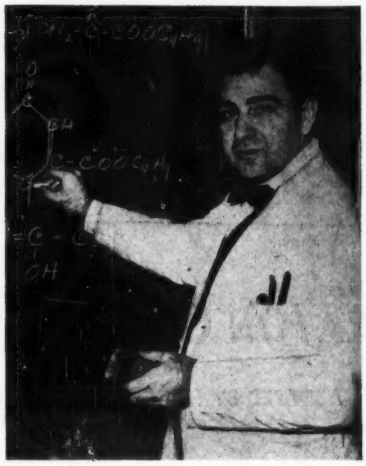
TIME WAS when an honest workman, empty dinner pail in hand, trudged home, stuck his head in the door, and prophesied, "Corn beef and cabbage for supper." Today even the wife of a breadwinner affluent enough to anticipate filet mignon on his dinner table considers herself a failure if he gets wind of what's cooking until it's set before him.

Competition in supplying such demands for simulated fresh air has been largely an intramural affair among wick-type deodorant manufacturers (*see* "Osmic Enterprise", *CI, October, 1947, p. 609*). Aerosols, having attained full growth in the insecticide field and anxious for year-round markets, are now in the battle for these consumer dollars, too (no small potatoes either, for household sales alone of one wick-type deodorizer have been estimated at over $4 million per year).

Beat 'Em or Join 'Em

Two types of new bombs are on the market: those that mask the noxious odors, and those containing agents that combine chemically with sulfur and nitrogen compounds responsible for most offensive household and industrial odors. Deodorants based on the neutralization principle also usually contain a scent to give an immediate aroma of freshness and to increase customer appeal and acceptance.

Metazene, the deodorant developed by L. B. Kilgore (Kilgore Chemicals Inc.) is one that people will be hearing much about, since the owners have just granted Boyle-Midway exclusive license to use it in aerosols for the retail trade. It is the result of several years' work to find a synthetic organic compound with an active unsaturated radical that would readily react with unsaturated sulfur and nitrogen compounds to form odorless—or relatively odorless—addition products. Best of the lot tested was Metazene (approximately $C_{17}H_{30}O_3$), a high-boiling yellow liquid readily soluble in hydrocarbon solvents and such propellants as the Freons. (The new Genetrons are being tested.)



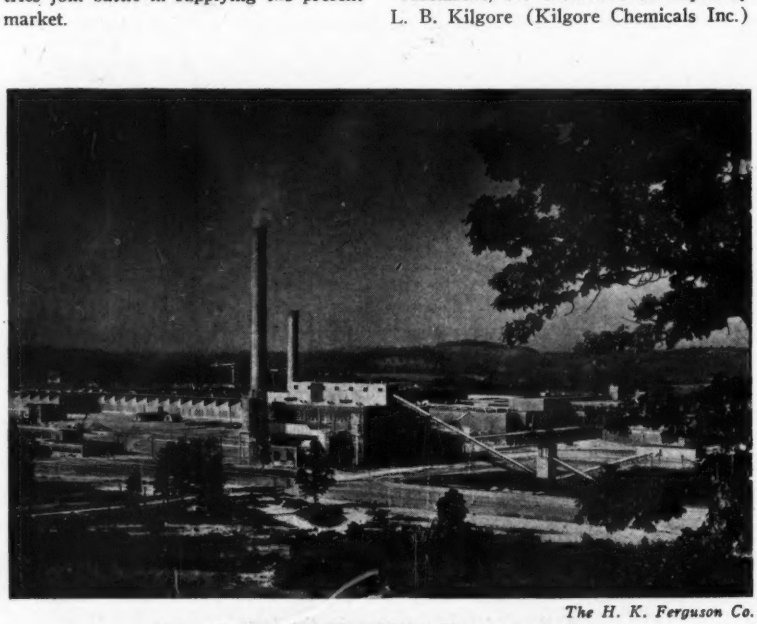
L. B. KILGORE: He erases odors.

Formulations of the Metazene type contain about 3-5 per cent deodorizer, 10-15 per cent mineral oil or deodorized kerosene, and the rest propellant. To give fleeting fragrance a volatile lavender or citrus scent has been found most desirable.

Contenders Growing

True to the pattern of the chemical specialties field, the trickle of new products already has given promise of a flood to come. Vamoos Products, Inc. introduced its Vamoos (*CI Newsletter, December, 1948*) in the Chicago area in mid-November, and plans wider distribution. This is a deodorant of the neutralizer type with added scent, is packaged in a 12-ounce can called an Automizer.

Pennsylvania Engineering Co. claims to have had the first one on the market, but it has actively advertised only recently. In sharp contrast to the beer-can types, this is a sturdy high-pressure aerosol holding 16 ounces. Its active ingredient is a new chemical for which a patent has been applied. A perfume masks the deodorizer, but this disappears within five minutes although the deodorant con-



The H. K. Ferguson Co.

NEW AMERICAN ENKA PLANT: Tire yarn came first.

tinues working longer. The company states that the higher pressure gives faster and better action than low-pressure models, and apparently feels that such performance will sell its Odorlost at $3.95 (refills at $2.30).

Kilgore marketed its own product Odorex for about a year, mainly to institutions, but has given way in the retail field to Boyle-Midway's Silver Label Spray Deodorizer, soon to be out in a 12-ounce can. Among others finding good acceptance in department stores are Bridgeport Brass Co.'s Good-aire (available in 3½- and 12-ounce sizes) and Rex Research Corp.'s Rex Deodorizer.

Price Cutting

The big problem of those in the new field or those contemplating the move is whether the products can be well launched before some Johnny-come-lately in search of a fast dollar undermines them with a bomb priced too low to allow advertising support. Insecticide manufacturers claim that such a situation all but killed low-pressure aerosol insecticides last summer. Introductory prices somewhat under two dollars permitted good formulas and enough margin for a strong consumer-education program. However, new manufacturers came in for a free ride on the other fellows' advertising and offered tin-can aerosols at about a dollar. Prices had to drop, advertising was out, and some formulas were cheapened. With small markup, retailers didn't push too hard and there were no ads for the consumer to see. It could happen with deodorants.

If aerosol deodorants are not to suffer a similar fate, the trade figures a 12-ounce can (low-pressure type) will have to be in the $1.49-1.89 range. They are coming in at such prices, but whether these will hold is another question.

An even greater obstacle is the wick-types which sell for 39-69 cents for 5-6 ounces that last 2-3 months. While many people, out of curiosity for a new gadget, will buy an aerosol deodorant once, it will take some convincing to overcome the price differential on repeat sales. Indicative of the position of the wick men is Seeman Bros.' statement that they don't think they belong in the aerosol picture at all.

Other Fields

Although the household business is the immediate battle scene, this is by no means the limit of the field. Hospitals, hotels, restaurants, mortuaries, laboratories, kennels, theaters, railroads, and airlines are potential markets. Many of these are already serviced by deodorant sprays, but the great convenience and fine particle size of aerosols are good selling points. Larger capacities and high pressures will probably be most suitable. Kilgore has sold Odorex in a 5-lb. high pressure cylinder, and is at present negotiating with firms on these larger deodorants for institutional work. Other companies will undoubtedly follow in the mass attack on odors.

ON WINNING FRIENDS

Dewey and Almy shows how, in NPA report on what makes labor peace.

DEWEY and Almy Chemical Co., of Cambridge, Mass., and its union, Local 86 of the International Chemical Workers (AFL), are joint wearers of laurels this month as subjects of a case study on "causes of industrial peace."* Sponsored by the National Planning Association under a grant from John Hay Whitney, the study is one of a series devoted to finding out "how much [industrial] peace there is and what makes peace," as against the reverse and time-honored procedure of inquiring into the causes of industrial strife.

For the D&A-Local 86 relationship, the NPA investigators have words of high praise: "It is characterized by an almost complete absence of conflict, and by an atmosphere of genuine friendliness and mutual respect. Neither party dominates the other. There are relatively few grievances, but it is quite clear that grievances are not being repressed."

No Fireworks

Lion's share of the credit for this happy state of affairs is bestowed on D&A's genial, fair-dealing president, Bradley Dewey. Back in 1939, Dewey hired a personnel director. He did so because the demands of his fast-growing organization were becoming such that he could no longer personally devote the time to employee-management problems that he felt they required. But some of his employees saw the action in a different light: "You brought a man in between you and us to deal with us," they said. "We feel that in that case we need a union to deal with you."

The stage was set for that militant phase that marks the beginning of so many union-management relationships. But the fireworks didn't go off. Instead, Dewey accepted the union in good faith and in a friendly spirit. Turning from an earlier tendency toward paternalism, he let the union stand on its own feet, treated it as a partner in important matters. He instilled in his line management people — the foremen and supervisors who do most of the direct dealing with the hourly employees — some of his own philosophy and an acceptance of their part of the responsibility for maintaining a sound relationship.

DEWEY AND FRIENDS†: Chemical makers make peace.

Harmonious Autonomy

The union, too, deserves some of the credit, NPA feels. The autonomy enjoyed by Local 86 has contributed much to the harmonious conditions. The union has been free to set its own policies within wide limits and to adjust its demands to the circumstances at hand.

But neither the union nor management

* Causes of Industrial Peace Under Collective Bargaining—Case Study No. 3: The Dewey and Almy Chemical Co. and the International Chemical Workers Union, by Douglas McGregor and Joseph N. Scanlon. 88 pages; $1. National Planning Association, Washington, D. C.

† L. to r.: Ernest Robertson, president, Local 86, International Chemical Workers, AFL; Bradley Dewey; Edward O'Brien, international representative, International Chemical Workers, AFL.

at D&A believe their relationship is perfect. They both realize it takes more than peace to make health in a wide-open, tough industry. They are therefore now seeking ways and means to work together more effectively toward another common goal: that of placing their company in an unassailable competitive position.

FASTER AND HARDER

New polyhydric alcohol gives fast-drying, hard films when combined with soybean acids.

IT IS NO wonder that 2,2,6,6-tetramethylolcyclohexanol is called T.M.C. for short. This new polyhydric alcohol was born of General Mills' research program aimed at building increased value into agricultural raw materials. Its conception as a General Mills product dates back to the war years when Harold Wittcoff joined the company's research laboratories.

During the war, soybean oil was as precious as a new baby's first smile. Since the needs of the armed forces, the Lend-Lease program and a civilian population flush with war dollars combined to generate a tremendous demand for edible oil, the government channeled more than 90 per cent of soybean oil production into edible products. This left only a trickle for use as a drying oil in alkyd resins and other protective coatings, linoleum, oil cloth, printing inks and similar materials.

Building for Peace

Looking to the future, however, General Mills began grooming soybean oil for what appeared to be an attractive postwar drying-oil market, expanded by new applications developed through wartime research. Accordingly, the company established its soybean processing plant at Belmond, Iowa, and initiated research to improve soybean oil's drying properties.

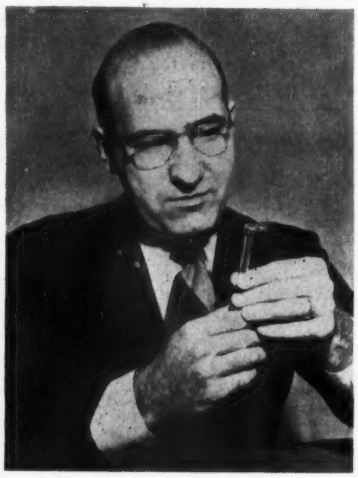
After joining General Mills, Wittcoff immediately attacked that problem by investigating many polyhydric compounds. Of these, he found the most promising to be T.M.C., originally reported by the German chemists Mannich and Brose in 1923.

Since there had been no conception of the possible use of this product in the protective coating industry and since disclosed methods of preparing it were inefficient, Wittcoff first worked out improved laboratory techniques for making the compound, and with W. A. Jordan, head of applied research, began to spotlight applications in which it might be valuable. Later, Robert J. Foster, development engineer, engineered the process for pilot-plant production, and M. H. Baker, of the commercial research group, launched a field evaluation program. Today, that program is well underway as General Mills' pilot-plant turns out small quantities of the product for examination by cooperating industrial firms.

Five Hydroxyls

Technically, 2, 2, 6, 6-tetramethylolcyclohexanol is a low-melting pentahydric alcohol with four primary hydroxyl groups and one secondary hydroxyl group. About 90 per cent of its OH groups are available for esterification. It is made from cyclohexanone and formaldehyde, condensed with the aid of a catalyst.

Combined with soybean or linseed fatty acids, T.M.C. forms synthetic drying oils



HAROLD WITTCOFF: Harder varnishes, jollier farmers.

that dry faster initially and produce harder, more abrasion-resistant films than do those made from other polyhydric alcohols. Varnishes formulated with these oils in the laboratory have consistently shown this same improved hardness and mar resistance.

General Mills has also prepared alkyd resins with T.M.C., using maleic acid as the dibasic acid component; since these alkyds, too, form extremely hard, abrasion-resistant films, they show great promise as protective coating intermediates. T.M.C. alkyds made with phthalic acid have been less satisfactory, but General Mills' research staff is attempting to find the key to their preparation. If it succeeds, T.M.C. may tap an important segment of this large market.

Many Possibilities

In addition, the five hydroxyl groups of T.M.C. make possible a galaxy of other potentially valuable chemical formulations: rosin esters give excellent varnishes; the saturated, higher fatty esters are hard waxes; and the partial fatty acid esters are emulsifiers.

Conversion of T.M.C. into plasticizers, lubricating oil additives, parasiticides and lubricants is highly feasible. Ethers, esters and acetals of T.M.C. may show promise as solvents and plasticizers, and partially esterified or etherified T.M.C. may be sulfonated to yield water-soluble or water-dispersible compositions for plasticizers and lubricants. Reaction of T.M.C. with unsaturated nitriles such as acrylonitrile produces intermediates for polyamines or polycarboxylic acids.

Versus Pentaerythritol

Although it is difficult to determine the ultimate place of T.M.C. in the chemical economy, preliminary market studies indicate that the compound may become an important intermediate in the protective coating industry. Because of its ability to form drying oils, rosin esters and alkyds with superior film-forming qualities, it logically may gain a reasonable share of the market now held by pentaerythritol and other polyhydric alcohols.

EXPOSING LABOR

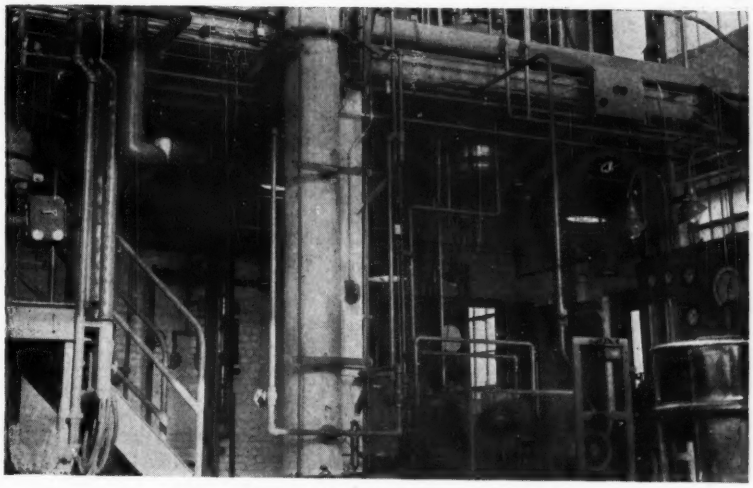
Ansul Chemical Co. sends plant men to industry expositions, where they see competition, learn of management's problems.

ANSUL Chemical Company of Marinette, Wis., recently tried an experiment in industrial relations that promises to pay big dividends.

Ansul, regular exhibitor in the National Chemical Exposition and National Safety Congress, sent one of its plant employees to each of these meetings.

The men, Joseph Cherney and Robert Schultz, one a machinist's helper and the other a turret lathe operator, were chosen by the Ansul employee committee. Joe and Bob stayed in Chicago two days, receiving full pay plus all expenses. They each helped out in the Ansul booths, but spent most of their time viewing the exhibits and talking to customers and competitors.

What did they get out of it besides a couple of days "on the town"? A better perspective—unobtainable from a small Wisconsin town—of the industry and their firm's place in it; realization that the chemical industry is a rough-and-tumble of competition; appreciation of the fact that salesmen are as vital in company operations as plant men. Cherney and Schultz went back to Marinette, told their fellow workers what they had seen; and as a result all of them have a clearer picture of their jobs.



OXO PILOT PLANT*: Oxo learns the alphabet.

OXO EXTENSION

Rohm & Haas is making a series of compounds from diisobutylene in an Oxo pilot plant.

THIS MONTH still another chemical manufacturer is standing up to be counted among those who have latched on to the reaction of olefins, carbon monoxide and hydrogen—the Oxo process, which is ordinarily used to give the alcohol with one more carbon atom than the original hydrocarbon *(see CI, August 1948, p. 211)*.

But the reaction, under proper conditions, can also be used to prepare the corresponding aldehyde, and this aspect of the process is being exploited in a newly-constructed pilot plant at Rohm & Haas Co.'s Bridesburg (Philadelphia) works. There a new application of Oxo is taking form: extension of the process to the synthesis of a whole series of chemicals.

Six chemicals are available from the nonyl aldehyde (3,5,5-trimethylhexaldehyde) which is the primary reaction product of diisobutylene, carbon monoxide and hydrogen: nonanoic acid, nonylamine, nonyl aldehyde cyanohydrin, α-hydroxydecanoic acid, octadecenyl aldehyde and octadecyl alcohol. Steps from the initial aldehyde to each of the six products are simple, standard reactions.

Diisobutylene was a logical choice as a raw material for the company had become familiar with it in the production of octylphenol. Moreover, unlike most olefins, which give several isomers in the Oxo reaction, diisobutylene gives but one.

More in the Offing

Most of the suggested applications are just good ideas, based largely on analogy with similar commercial compounds. If markets develop, Rohm & Haas will build a full-scale plant. If that plant should be built close to olefin sources — on the company's Texas site, for example — there would be no need to confine the process to diisobutylene derivatives. Then acids, aldehydes, amines — the whole A to Z of derivatives, in fact — could be tailored to fit the industrial frame.

* **Far left**: portion of liquid-level controller for high-pressure product receiver; center column: reactor for olefin, carbon monoxide and hydrogen; left of and behind reactor: olefin feed-rate tank; right of reactor between floor levels: olefin feed tank; right of reactor at floor level: feed pump; far right: control board for reactor; behind reactor against wall: control board for carbon monoxide and hydrogen.

SUPERFLIES

DDT-resistant flies are current public relations problem, future technical hurdle.

SOAP OPERAS have a potent rival in the trials of the insecticide business. After staggering along under the burden of late springs the past two years, general consumer apathy toward insecticides, conformance with the new federal insecticide law, and state registration and fee requirements, the industry appeared headed for better times. Now failures of DDT to kill flies in some areas have provided another crisis.

True to the classic tragedy form developed by radio, the instrument for good is the industry's nemesis at the moment. For the past year, progressive insecticide manufacturers have campaigned for educational programs to acquaint the public with the value and proper use of their products. DDT has been cited as one material in which the consumer had faith, to a large extent because of the amount of free publicity it has received. Some claims for this, and by extension for all insecticides, were regarded as exaggerated and detrimental to the business, in that disappointed users lost faith in the products. Proper consumer education was felt to be the salvation of the slumping business.

The low ebb of insecticide sales was about to force some positive action on publicity plans. Reports of DDT-resistant house flies, however, interested newspaper feature writers and science editors of Sunday supplements who have not waited for the insecticide industry to tell its story. The current kind of publicity is hardly what manufacturers had in mind.

Two Jobs

Now the same fellow who knew that DDT was the end-all among insecticides is sure that it can't kill a thing. This leaves insecticide men with a doubly difficult task: they have to kill resistant flies and try to tell prospective customers the complete story on the new breed.

In discussing the extra-tough flies at the recent meeting of the National Association of Insecticide and Disinfectant Manufacturers, E. F. Knipling, of the U. S. Department of Agriculture, pointed out that reports of DDT failures have been very spotty both here and abroad. In many cases, less than recommended amounts were used, thorough treatments were not made, and rigid sanitary practices were not followed. High temperatures, at which DDT is less effective, may have been partly responsible. Failures, however, were admittedly greater than expected even under unfavorable conditions of application and sanitation.

Wild Flies Tougher

Preliminary tests indicate that wettable powders are in general better than emulsions or oil solutions, and that there are some differences in performance with different brands. Flies' ability to detect DDT is also indicated, but this is not a major factor.

Comparison of laboratory flies with those found wild in areas of complaint showed clearly that the main cause is resistance to killing action: in one test, wild flies required twelve times as long contact with DDT as laboratory flies to be killed in equal proportions. Other wild flies could rest on DDT surfaces twenty to forty times as long as lab flies for the same kill. In the field, where flies are not forced to rest on panels, efficiency is undoubtedly much lower.

Agriculture Department entomologists proceeded to develop their own tough flies. Successive generations of laboratory flies were exposed to DDT space sprays, and the resistance of the offspring of sur-

vivors checked. The fifty-fifth generation required 120 times as long a contact period as flies from the antecedent colony for a 70 per cent mortality rate, and about 200 times as long for a 90 per cent rate. Obviously these were hardier fellows.

Very preliminary work on carryover of this resistance to other insecticides has given no clear picture. USDA work on laboratory-raised resistant flies indicates that there is some resistance to methoxychlor, benzene hexachloride, and chlordane, but nothing like that to DDT. Other tests on wild and laboratory DDT-resistant flies have shown no carryover of resistance. Such conflicts may be explained by differences in strains of flies on which tests were run.

Many Gaps

Many gaps remain to be filled before much can be done about the latest insecticide headache. All the USDA work has been done on residual sprays, for which DDT has been so popular, although the flies used in the tests have been survivors of space sprays. Possibly flies would be more vulnerable to space sprays.

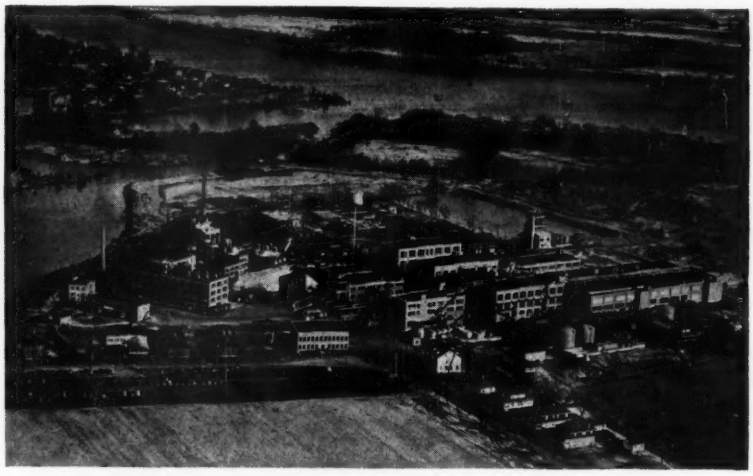
Stories of mutations have been given wide circulation, and one Swedish report tells of resistant flies with thicker footpads which protect them from DDT. U. S. workers have not yet had time to discover morphological changes if such exist, but they have shown that flies are also resistant to drop treatments on other parts of the body. This would appear to eliminate thicker footpads as the explanation. Any complete answer will require a long-time attack by physiologists.

Last year John Powell & Co., Inc., faced the problem in Dutchess County, N. Y., where DDT coatings had "worked like a charm in 1945, 1946 and 1947, but were not worth anything in '48." There contact sprays were used when coatings did not work.

Policy for 1949

Some manufacturers may employ combinations of pyrethrum or chlordane and DDT. The aliphatic thiocyanates and benzene hexachloride also are possibilities. Others say that when DDT is used properly it will work. (Fly population in areas of failure was only one-fourth that present before DDT was first used in 1945.) USDA emphasizes that DDT was successful last year despite the scattered failures and will recommend it in 1949. Methoxychlor or chlordane is recommended where there are failures.

Those who have followed the insecticide story feel the industry is due for a break in its series of troubles. But it may have to change the script itself by starting on its much-talked-about publicity campaign while its technical men cope with the new flies.



BRISTOL: From leather bate on the Delaware to tonnage petrochemicals . . .

PHILADELPHIA STORY UNFOLDS

Stock sale gives public first peek at Rohm & Haas' $60 million-a-year business and its changing corporate structure.

THE SAME CURIOSITY fabled to have killed the cat was cheated out of many prospective victims in the chemical industry last month. In the process of selling twenty-five per cent of Rohm & Haas Co.'s stock, the Attorney General of the United States put the spotlight on the internal structure of the $60 million-per-year business that has grown from Otto Haas' small manufacturing facilities of 30 years ago.

During this period of expansion, the public has watched Rohm & Haas successfully market its chemicals to an increasingly diverse number of industries. However, relationships between different departments within the company and their relative value to it have been matters of speculation, for the closely held company has held its business closely. Now, as its new $8-million plant at Houston, Tex., heralds a trend toward manufacture of its own raw materials, the company pattern is clearly outlined for the curious.

Tale of Two Cities

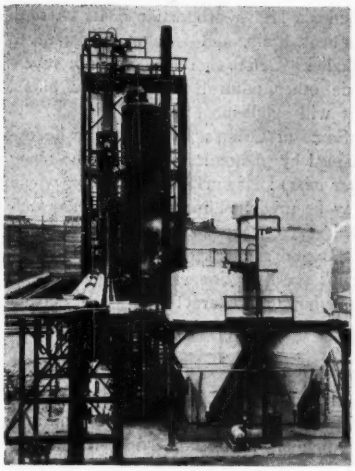
Darmstadt, Germany, figures in the origin of the Philadelphia company and in the current stock offering. In 1907, Otto Rohm and Otto Haas founded a business there to manufacture and sell Oropon, Rohm's enzyme bate used in making leather. Two years later Haas came to this country, where he had previously worked, and set up a similar organization, first in Chicago, and then in Philadelphia, the company's location when incorporated in 1917.

With U. S. entry into World War II, business connections between the two companies were severed, but the heirs of Dr. Rohm, who had supervised Darmstadt operations until his death in 1939, retained a beneficial interest in a Pennsylvania trust which held his stock in the Philadelphia company. These shares were vested by the Alien Property Custodian in 1942 and are now offered for sale. Disposal of another 8% of stock awaits the outcome of a suit under the Trading with the Enemy Act.

Haas and members of his family own well over half of both common and preferred stock of the U. S. company, and the remaining shares, exclusive of those held by the Attorney General, are held by company officers and employees. Moreover, Haas has first right to repurchase the latter shares if the holder dies, proposes to sell it or, in some cases, leaves employ of the company. Although Haas still owns 40% of the German company, there are now no business relationships between the two firms.

From Bate to Oxo

A business founded on a chemical for leather tanning would naturally expand in that field; and the original plant acquired in Bristol, Pa., in 1916 soon was turning out finishes, synthetic tans, and mordants for dyeing leather. World War I, which cut off this country from German textile chemicals and dyes, helped speed the company's entry into the textile chemical field. Gradually the line was extended to include today's broad range of plastics, heavy chemicals, agricultural and sani-



HOUSTON: . . . on the Channel.

tary chemicals, and industrial enzymes.

While these products have been sold almost wholly to users for special applications, a recent trend has been the production and sale of chemicals as such. A further step in this direction is pilot plant production of a series of chemicals from diisobutylene via the Oxo synthesis *(see p. 33)*.

Paralleling the increase in company interests has been a rise in sales—from nearly $10 million in 1938 to an estimated $60 million for 1948, about 7% of which will be profit. Internal developments have been primarily responsible for this growth with one exception: purchase of Charles Lennig and Co., a manufacturer of heavy chemicals. Most of the stock in this organization was acquired in 1920, and it was operated as an integral part of Rohm & Haas. Later the remaining stock was bought, and at the end of 1947, the company was dissolved, its business and assets becoming part of the parent organization.

Plastics

Like Oropon, the company's original product, the material with which Rohm & Haas is probably most readily identified—Plexiglas — is linked with Otto Rohm's early work: his doctorate thesis at the University of Tübingen in 1901 was on polymerization of acrylic esters. However, investigation of commercial applications of such materials was not undertaken by Rohm until the '20s. Eventually the Bristol laboratory took up the work; and when Rohm & Haas went into acrylic manufacture, certain patent agreements concluded with the German firm in 1934, and licenses under I. G. Farbenindustrie patents, gave it a big jump on the field.

The war brought a demand for polymethyl methacrylate bomber noses, turrets and aircraft canopies. In 1941 Rohm & Haas leased a plant from the government at Knoxville, Tenn., for Plexiglas production, and set up another at South Gate, Cal., for fabricating it into necessary parts. At war's end the South Gate plant was closed, but the Knoxville unit was purchased early in 1946 for $1,100,000. This, acrylic facilities at Bristol, and the new acetone cyanohydrin plant at Houston constitute the company's plastic capacity. For the first nine months of 1948 their output contributed 24% of the company's gross, a drop from the peak of 52% in 1944, but up substantially from 1938's 6%.

Houston Plant

With the opening of the Houston plant the company's competitive position in raw materials for methacrylate plastics and acrylates (adhesives, oil additives, leather finishes) has been greatly strengthened. Here the major unit produces hydrogen cyanide from methane—purified by hypersorption—and ammonia. (Du Pont's El Monte, Cal., works is the only other U. S. plant using this reaction.) The HCN then reacts with acetone to produce acetone cyanohydrin or with ethylene oxide for ethylene cyanohydrin (*see p. 60*). Hydrolysis, dehydration and esterification in other company plants yield the methacrylates and acrylates respectively.

In addition to providing the company with its own source of materials, the new plant should shore up the whole line of resinous products, leather chemicals and general sales.

Resinous

Conscious of the latent importance of synthetic resins, Haas and associates in 1926 set up The Resinous Products and Chemical Co. to manufacture these materials for use in paints, varnishes and other coatings. Today its main products are oil additives, plywood adhesives, ion-exchange resins, coatings resins, plasticizers, amine-formaldehyde resins for improving wet strength of paper, and synthetic lubricants.

Although Resinous always operated as an extremely close affiliate of the company, it was not until last September that it was merged into the company as an operating division. Now the largest division, during the first nine months of 1948 it transacted 36% of the company gross and returned the greatest profit.

General Sales

Catch-all of the company from an accounting standpoint is the general sales department which currently represents about 11% of the company revenue. Products include methylamines, various inorganic heavy chemicals, acrylic monomers, industrial enzymes and other materials. Since several by-products from other departments of the company are included, profits fluctuate widely.

Leather and Textiles

If these by-products are not apportioned to the activities whence they are derived, then leather chemicals, once the only products, now rank fifth in sales, but third in profits. (The six divisions in order of contribution to gross sales: resinous, plastics, general sales, textile chemicals, leather chemicals, and agricultural and sanitary chemicals.) The most important leather products are synthetic tanning agents and various types of resin emulsions for finishing.

Again disregarding apportionment of by-product profits, the textile department contributes a somewhat lower percentage of company profits than leather chemicals, but a slightly higher percentage of gross sales. (Leather and textile chemicals each represent roughly 10% of the business.) Products include reducing and stripping agents for dyestuffs, resins for textile finishing, enzymes for textile desizing, and a group of organic wetting agents and detergents.

Agricultural and Sanitary Chemicals

Organic insecticides and fungicides developed by the company constitute a major portion of agricultural chemical sales. Profits of this division have been adversely affected the last two or three years by competition from natural products no longer cut off by the war and DDT.

Rohm & Haas quaternary ammonium compounds, called Hyamines, are important antiseptics. Tritons, principally polyethylene oxide wetting agents and detergents, enjoy wide sales in the sanitary field as well as in textile industry. Sales of both agricultural and sanitary chemicals were about 9% of the total for the first nine months of 1948.

Next Chapter?

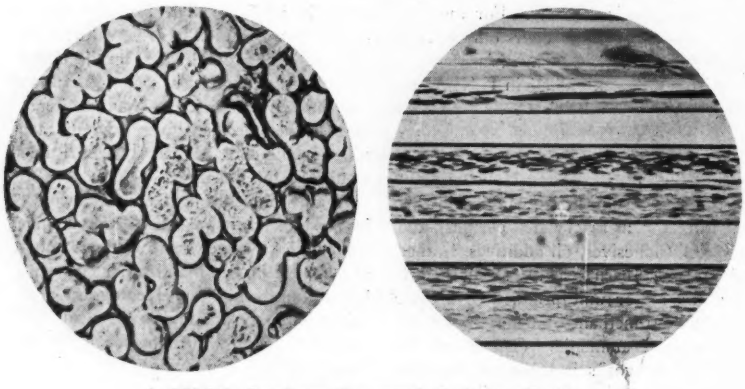
Rohm & Haas will continue to be known as the Philadelphia company that makes special products on a large scale. But the Houston plant and recent interest in the Oxo synthesis indicate that the company will play an even more important role in the chemical industry as it begins large-scale manufacture of its own raw materials and basic chemicals for sale.

Sales in 1948 will exceed the 1944 peak of $53 million, most of which was Plexiglas. Topheavy dependence on this one material for sales and profits has given way to reliance on a broad line of supporting products. Such a condition makes a company less vulnerable in times of stress.

BROTHER ORLON

Tough, resistant to chemicals, and weatherproof are the words for Du Pont's new polyacrylonitrile fiber.

JUST ABOUT ten years ago, E. I. du Pont de Nemours & Co. sent out birth announcements, for unto it had been born a daughter, Nylon. Last month out came the trappings again for Orlon, Nylon's newly-arrived brother.



ORLON: Dog bones for warmth, bark for adhesion.

The attribution of sex is not capricious; for Nylon is primarily associated in the public mind with filmy lingerie and sheer hose, while Orlon seems initially destined for the outdoor life — in rainwear, umbrellas, jackets, awnings, tents and sails.

The advent of Orlon, like that of Nylon, was inspired by the late Wallace Carothers' brilliant researches in the field of fiber-forming polymers. From those researches was developed the concept of totally synthetic fibers in general, and Nylon and Orlon in particular.

Years in the Making

Although official revelation of the new fiber was made only recently, pilot plant exploration has been under way for four years. The secret was too big to keep, and news of Fiber A (as the material was known within the company) filtered out long before the formal announcement was made *(CI Newsletters, July and November, 1947)*.

The pilot plant was built at Waynesboro, Va., in 1944, after laboratory work proved the feasibility of the process. Thereafter emphasis was placed upon development for military uses, but the war ended before the project was completed. Market exploration convinced Du Pont that Orlon could be successfully commercialized, and decision was made last October to build a plant costing well over $10 million at Camden, S. C. Construction is expected to start in March and completion is scheduled in 18 months.

Spinning of Orlon is much like that of cellulose acetate. Polyacrylonitrile is dissolved in a suitable solvent — finding that solvent, incidentally, was one of the major research problems — and extruded in a continuous filament, which forms by evaporation of the solvent. Du Pont itself will supply the solvent; dimethyl formamide, dimethyl methoxyacetamide, tetramethylene sulfone (obtained by hydrogenation of the easily-prepared sulfur dioxide-butadiene adduct), and the *m*- and *p*-nitrophenols are examples of suitable materials.

Silky and Woolly

Du Pont says flatly: "Orlon continuous filament yarn is the most silk-like synthetic fiber, while Orlon staple is the most wool-like synthetic fiber of which we have knowledge." But the company goes even further: "Orlon's resistance to outdoor exposure is so good that we feel that it is the best fiber we know of, natural or man-made, for outdoor use." In an outdoor exposure test of Orlon, silk, nylon, linen, cotton, and viscose rayon, Orlon retained 77% of its strength after 1½ years — by which time all the others had completely failed.

Its catalog of virtues also includes high tensile strength (both wet and dry), high resistance to stretching, high flex life, rapid drying, bonding to resins and rubbers, dimensional stability to heated gases and liquids, resistance to acids and acidic fumes at high temperatures, and resistance to insects, molds, and mildew.

Its electrical properties — low moisture absorption and low dielectric constant and loss tangent at microwave frequencies — give an indication of the military uses for which it was explored.

No chemical material, of course, is a paragon; and Orlon—true to the nature of things—is not without its limitations. The fiber does not take dyes readily (although research progress is claimed); nylon has greater resistance to abrasion, retains a higher proportion of its strength in heated air, and is more resistant to alkalies. Orlon, therefore, will not supersede other natural and synthetic fibers, but will supplement them.

Some of Orlon's properties can be explained by photomicrographs of the fibers (*see cuts*): Its surface wettability, which may be predicted from its bark-like striated surface, accounts for its adhesion to resins and rubbers. The irregular, "dog-bone" cross section explains the warmth and bulking characteristics of Orlon staple.

Continuous First

The first product of the Camden plant will be 100, 200 and 300-denier continuous filament fiber. Staple fiber will not be made initially, for development work is not yet complete. It should be pointed out that the trade-mark "Orlon" does not refer to a single fiber or yarn having definite properties and made by a definite process, but rather to a family of acrylic fibers. All have certain properties in common, but each has distinctive characteristics.

The 1952 status of Orlon is no easier to predict than the outcome of the 1952 election. It may ultimately rival or surpass nylon, both in pounds per year and cost per pound; but in the immediate future its use will probably be limited to applications where its resistance to sunlight and weather makes it a natural. At any rate, Du Pont is spending several million, and it is not in the habit of buying Brooklyn Bridge from city slickers.

GREASE ON SKIDS

Silicone coating eases pan cleaning, allows greaseless cooking.

A NUMBER of years ago Eddie Cantor sang a song that advised the eligible male to "grab yourself someone who'll fry your eggs in bacon." The bacon may have fallen casualty to high prices, but a new product should help guide any matrimonial venture over culinary shoals. Even women who have been burning pans for years are enthusiastic about its promise to eliminate greasing them and to ease their cleaning.

The new kitchen aid is sold in a kit consisting of two bottles: one, an organic cleaner that removes metallic oxides from a freshly scoured pan; the other, a solution of a high-molecular-weight, nonthermosetting silicone which is rubbed with a cloth over the inside surface of the pan. After the greater portion of the solvent has evaporated, the last traces are removed by heating the utensil a few seconds. Thereafter, the residual coating enables the housewife to fry or

bake without fat if she wishes, and to clean the pan by merely rinsing in hot water. Exhaustive tests have shown that there is no danger of food contamination.

Pantastic

Pantastic is the name under which silicones hope to win a permanent place on the kitchen shelf. Processed Surfaces, Inc., New York and Memphis, a company formed last summer to manufacture and distribute the "plastic that gives fantastic results" is now test-marketing it in a few cities, including Memphis, Tenn., and Boulder City, Nevada. From the data gathered in these exploratory markets, the company will plan its method of national distribution. At present, two ounces of the detergent cleaner and one ounce of silicone solution make a two-dollar retail item.

Among the officers and principal stockholders of the new company are John Koster and Paul Webb, whose work on carbon deposition in internal combustion engines led to the new household specialty. In the course of their investigations they found that a metal treated with a properly selected silicone exhibited altered properties: soot deposition was minimized and organic substances adhered less tenaciously to its surface. The possibility of coating cooking utensils suggested itself and their efforts were directed toward making its use by housewives practicable.

Thin Film

Thermosetting silicones were effective, but only in relatively thick films which were difficult to apply, scratched easily, and were too brittle for rough household handling. Thin silicone oils volatilized too quickly. The silicone that was developed has neither objectionable brittleness nor high vapor pressure. Although the film applied is so thin that it is undetectable, treated pans have given satisfactory service for as long as eighteen months. Both U. S. and foreign patents are pending.

Pantastic's big advantage is the ease of cleaning pots and pans: no scouring powder, soap or detergent is necessary; and scouring powder is actually harmful to the coating. Even when food is scorched in a treated pan, it is easier to clean the food from the pan and replace the damaged coating than to do the usual, tedious scraping and scouring job.

Greaseless Cooking

Processed Surfaces hopes to make a customer out of the fellow who likes his eggs fried but can't stand fat. He and invalids, children, and others on restricted diets can enjoy this previously forbidden form of cooking, for anything that can be fried in grease or oil can be fried without it in a Pantasticized pan. In addition to the argument of savings in work and cleaning materials, the housewife will also be attracted by the possibility of paying for her kit by savings on butter, lard or fat.

Pantastic has been going very well in the test cities. If the speed with which commercial bakeries have recently adopted silicone-coated baking pans (treated in special equipment by finishing companies) to eliminate the greasing chore and expense is any indication, Processed Surfaces has no worries. When a woman sees a new thing, she buys it; if it works, she keeps on buying it.

PANTASTIC: She can burn the food, but not the pan.

RISING TORULA

Hardy torula yeast converts carbohydrate wastes to high-protein feed supplement, pharmaceutical raw material.

FOOD yeast helped supplement the protein-deficient diet of the Germans during the war. Now it promises to aid the United States in solving a different type of problem: disposal of troublesome sugar-containing industrial wastes, such as fruit cannery refuse and sulfite liquor from pulp mill operations.

Cheaper Feed Yeast

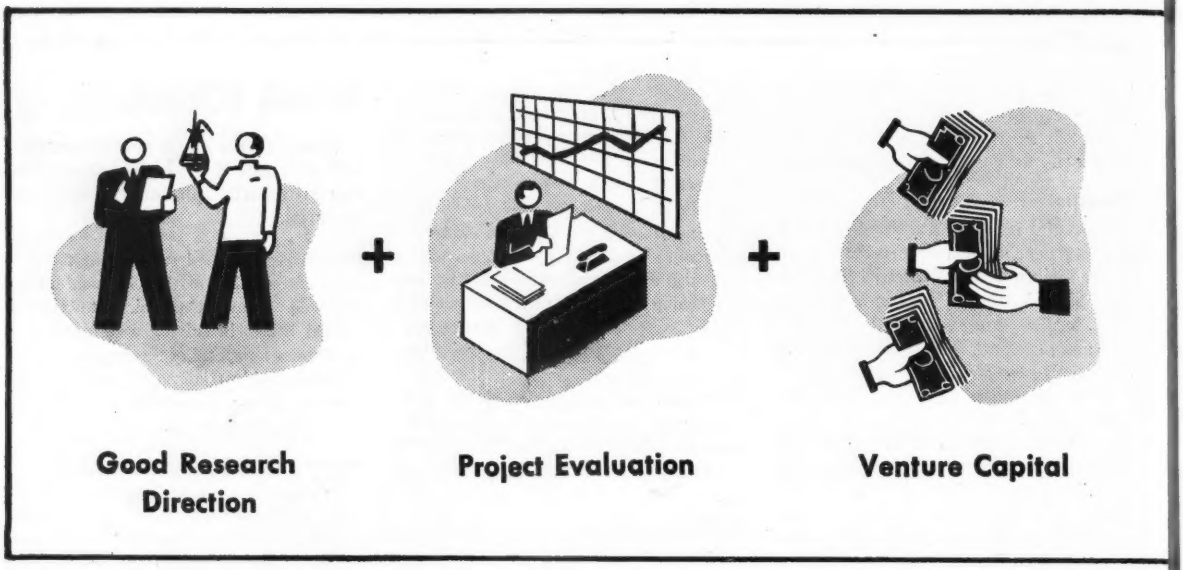
In the new plant of Lake States Yeast Corp. at Rhinelander, Wisconsin, a hardy, prolific variety of yeast called *Torula utilis* is literally eating up the waste liquor from 50 tons of pulp per day to produce 2,500 to 3,000 tons a year of dried yeast. The yeast is extremely high in proteins, enzymes and vitamins, making it an ideal enriching agent for animal feeds. In fact, that is why Albers Milling Co., of Los Angeles, the only other U. S. commercial producer, went into the business last year using molasses as its sugar source. Prior to Lake States' and Albers' production of torula, the only feed yeast made in this country was the somewhat more expensive brewers' by-product yeast.

Torula got its starting push in the United States from the Forest Products Laboratory in Madison, Wis., which was interested primarily in its possibilities for wood-waste disposal. It was this same interest that caused a group of Wisconsin sulfite pulp producers to form Lake States Yeast Corp. in 1946 to give the yeast an actual try.

Pattern Plant

The $400,000 Lake States plant at Rhinelander is considered an experimental unit on which others may be patterned if it is successful. It is located on property of the Rhinelander Paper Co., and ownership probably will revert eventually to that company.

Apart from waste-utilization possibilities, development of low-cost yeast cultivation methods have a long-range agricultural significance in this and other countries. From a land-use standpoint, yeast cultivation is the most efficient method known of producing proteins. Taking as a basis the acreage required for production of the necessary sugary material, the yield of protein per acre in torula yeast is several times that of the best protein-producing plants, such as soybeans and peas, and many times that derived indirectly from plant materials in the form of meat and dairy products.



Buyers' Market Calls for Research Audit

by W. F. ZIMMERLI, Consultant
New York, N. Y.

BETTER PROJECT EVALUATION and closer coordination of research activities to produce demonstrable results will prevent research budgets from becoming "cost-reduction" casualties.

THE impending buyers' market coupled with the current higher break-even points will force management to scrutinize expenditures more closely than ever. Budgets of so-called "non-productive" activities, where reasons for expenditures are more difficult to translate directly into the accountant's language of dollars-and-cents, will be major targets. Unless research staffs show concrete benefits to their companies, the high budgets and rapidly mounting costs of industrial research will become fair game for dollar-conscious executives.

Indications are that overall business activity will continue on a high level, but with reduced prices and profits. Industry will need all the assistance it can get from research, not only to reduce costs, improve quality and expand sales, but to maintain present markets. Nevertheless, scrutiny of research budgets will place emphasis on the demonstrable effectiveness of research efforts.

If reductions are indicated, the manpower pool represented by research personnel can be utilized in other activities. The average research man is somewhat of a specialist but one of high intelligence, imagination and ingenuity. Such qualities are always in demand in other divisions of the company.

ABNORMAL WARTIME EXPANSION

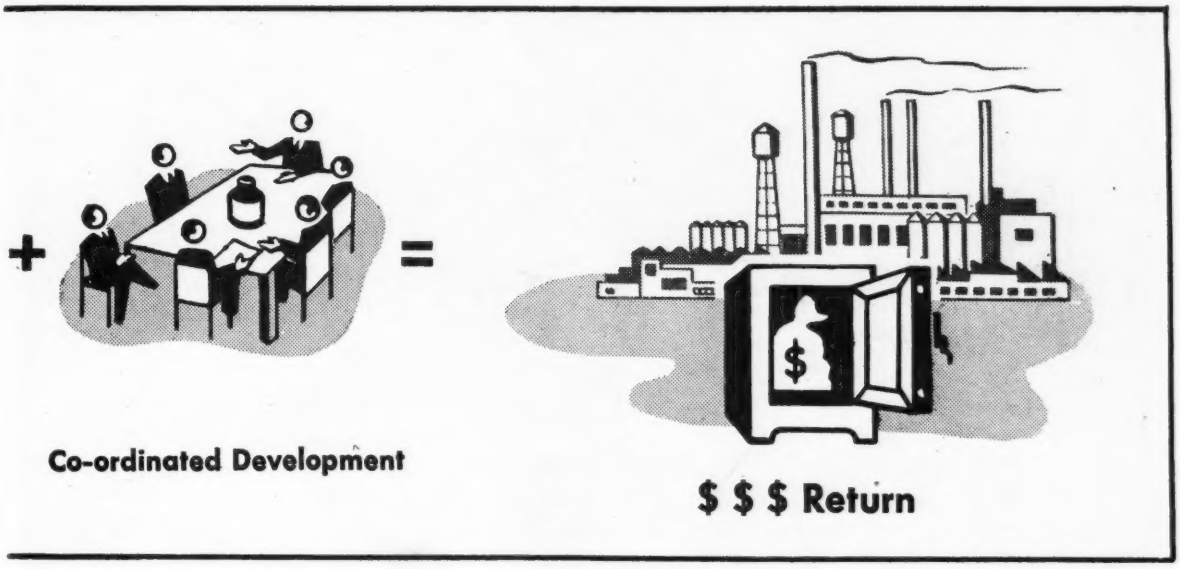
The great expansion in industrial research activities since 1940, due to wartime needs and apparent low costs resulting from application of the wartime excess profits law, has greatly accentuated problems of budgeting and administering industrial research. From 1940 to 1946 the number of professional men engaged in industrial research increased from 35,000 to 55,000*. Using $15,000 as the cost of maintaining one scientist in research, the total during 1946 was above $750 million. Maximum use of facilities recently completed or under constrction will mean a further increase in this already sizable figure.

This huge research bill is distributed among 2500 organizations ranging from small companies having two scientists to those employing over 1,000*. It is natural that such variations in size coupled with differences in industries, company resources, business policies and growth should produce extreme differences in budgets, methods of operation, and administration. These complex variations are currently the subject of much discussion, both verbal and in print.

Inability to devise a general formula for conducting research has not been confined to this country alone. A detailed study of research methods in Germany before the war showed that even among various I. G. laboratories, policies, organization and planning varied. Differences reflected in large measure the personal characteristics and ability of the director. The only evidence of evaluation of overall results, usually after expending much effort and money, was a directoral change.

Research evaluation is not simple because research success to a great extent depends on the skill with which the scientist's effort is "directed" to benefit the company. The word, "directed," is used because, contrary to general belief that research scientists are a temperamental lot and must be handled with kid gloves,

* "Industrial Research Laboratories in the United States", National Research Council, Bull. 113, 1946.



the good researcher can derive satisfaction from working toward specific objectives as well as chasing his whims. His morale and effectiveness are greatly enhanced if he feels that he is an integral part of the organization, rather than an isolated academic outpost.

Industrial research has grown so rapidly that there has not been time for proper "direction." Frequently, pressure of postwar reconversion and expansion has not permitted research administrators to consider carefully the changing requirements of the companies in the shift from a sellers' to a buyers' market. During the early postwar years much activity of the research laboratory was directed toward expansion into new fields to meet extreme shortages. Such opportunities are dwindling as production comes into balance with consumption.

COORDINATION REQUIRED

Poor coordination of a company's research activities (laboratory, pilot plant, sales and market research, economic and competitive studies, etc.) has often been characteristic of rapid research expansion under abnormal conditions. A fairly common management plaint is that more completed research projects exist than can be commercialized. Detailed study would undoubtedly reveal that many completed projects, thus classified, do not fit into current operations or are not economically attractive. Another revelation would be a great shortage of completed projects which are sorely needed to meet competition and higher break-even points. In such cases closer coordination of research with company requirements would have developed a much healthier condition.

Results are weighed on the return of venture capital from both short and long term projects, usually divided into three categories: major long term developments capable of standing alone, a step-wise accumulation of improvements which can be evaluated, and "protective" research which cannot be evaluated. A well planned research budget should be based on projects in these three categories which fit the nature and resources of the enterprise. They should be considered and studied from all viewpoints, particularly that of size of expenditure and man power required for final commercialization. Research ideas must fit the company operation and its resources.

SPECTACULAR DEVELOPMENT RARE

A spectacular development such as nylon is rare and beyond the capacity of the average company to undertake. The cost of original laboratory work to demonstrate its potentialities was relatively small compared to the cost of pilot plant and other research needed for commercialization. Successful research effort requires a great deal of critical study and consideration by highly experienced personnel. Few research organizations have adequate advice available on the overall economic and competitive position of the projects under investigation or are properly informed of company needs.

The magnificent return to industry and the American economy from investment in industrial research is a tribute to the quality of its administration. Research potentialities are still as great but the task of the administrator is becoming more complicated. The probability of embarking on unwise projects is increasing. Today proper development of objectives is more dependent upon economic and competitive studies than it ever has been in the past.

LONG- AND SHORT-TERM

Management recognizes that research appropriations are "venture capital" in its true sense and does not expect tangible beneficial results from all projects. However, it does expect a very tangible overall return. Achievement of this result requires a judicious balance of projects having immediate potentialities and those possessing a greater element of long-term risk. The latter are more speculative and the former must be depended upon to assure the adequate return on the overall research investment. They must have favorable economic potentialities and fit into company operation.

Greater emphasis is being placed on project evaluation prior to approval. Such evaluation is an expanding activity and management should view expenditure in this direction as an indication of the competence of their administrator rather than an admission of inability. It is becoming more evident that a substantial part of research funds spent on developing objectives and guiding their solution can bring greater returns than research based on inadequate information.

Events in the immediate past—war requirements, early postwar and the impending competitive conditions—emphasize the wide fluctuation of research operations. Those responsible for the conduct of these operations must be alert to developments, both within and outside the company, which can have an impact on their current operations. They must have the courage to modify or drop projects. They cannot control changing conditions but they are responsible for their recognition. A comprehensive and periodic audit of research activity will reveal how well they are discharging this responsibility and how it can be improved.

Six-unit furnace black plant at Ville Platte, Texas

Carbon Black Shifts to Furnace Process

by C. A. STOKES* and R. E. DOBBIN†
Godfrey L. Cabot, Inc.
Boston, Mass.

ADVENT OF SYNTHETIC rubber, first GR-S and more recently "cold" rubber, sparks change from channel black to furnace black.

THE carbon black industry is undergoing a change. Present trends indicate it is on the verge of large-scale replacement of the long-used channel black with furnace black. The year 1947 saw the production of furnace black nearly equal that of channel black and, judging from the rate of growth, its present production rate may well be greater. But more importantly, production of furnace black equivalent to or better than channel black is going up very rapidly. A better understanding of the fundamental properties of blacks, engendered by the synthetic rubber program, did much to promote this change-over.

Production of the other two most important types of blacks, lampblack and thermal black, is small. Lampblack is used largely as a tinctorial pigment and as a raw material for special electrical carbons. Thermal blacks have little tinctorial or reinforcing power and are used as special-purpose fillers or low-cost extenders in rubber.

The rapid changes now taking place in the rubber industry have affected the comparative economics of furnace versus channel black. In general, the properties of natural rubber stock compounded with furnace or channel blacks of approximately equal particle size are more nearly comparable than corresponding stocks based on synthetic rubber. Prior to World War II, furnace black had not been made with a particle size comparable to that of channel black; thus the latter black possessed a distinct competitive advantage. However, this situation was reversed with the introduction of GR-S, and the development of many new types of furnace blacks has shown that particle size is not necessarily the controlling factor in reinforcement of synthetic rubber. The appearance of so-called "cold rubber," which became available this year, has further changed the competitive situation, for the road life of furnace black reinforced "cold rubber" tires has been increased 25% or more over the road life of tires reinforced with channel blacks.

PROCESS COMPARISONS

Advantages such as the above were needed to justify furnace blacks. The investment in a furnace plant operating on natural gas to make a black as reinforcing as channel black is about 15 to 20 cents per pound of black produced per year, while for the last new channel plants built (1943) the investment was about 10 cents per pound per year. It must be remembered, however, that plants to make the less reinforcing grades of furnace black (semi-reinforcing and high-modulus furnace) are much less costly than plants to make furnace blacks equal to channel in reinforcement. Similarly the use of oil enrichment at the present relative values of oil and natural gas makes for a lower investment per annual pound of highly reinforcing furnace black. This latter advantage assumes greater importance as the price of natural gas continues to increase.

CHANNEL BLACK

A plant for channel black production contains many thousand small smoky flames, burning about two inches under the flat surface of channel irons upon which they impinge and deposit "channel black." A typical plant may be composed of two to three hundred steel buildings commonly called "hot houses," and in each of these buildings many carbon producing flames are burned. In the process,

*Director of Research and Development.
†Group leader, Applied Research.

a large excess of air is admitted into the hot buildings, but combustion conditions of the flames are such that carbon black, a product of incomplete combustion, is formed. After the black has been deposited by impingement on the channel irons, it is mechanically scraped off and conveyed to processing, pelleting, and packaging operations. Channel black differs from other types of black in two intrinsic properties: its color is nearer true black, and, in some of its forms, it is more finely divided than any other carbon.

The yield of channel black per unit of gas burned is small, and a large fraction of the production is lost as smoke that fails to collect on the channels. Unless further gas supplies are made available at a low enough price, and indicated life for the gas field is long enough, it is unlikely that the channel process will constitute a large portion of new production facilities. Cheap gas is available in enormous quantities in the Middle East, but it is doubtful if any channel black manufacturers would consider risking capital to build plants in that area.

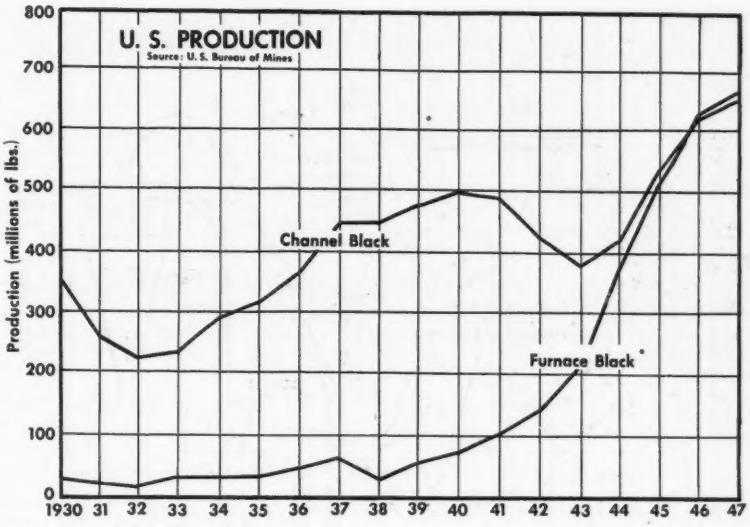
Obviously, existing channel plants will continue to operate as long as some profit can be made. Today the channel black industry is spending large sums of money to rehabilitate its facilities for more economical operation and better control of quality. Such repairs are costly; and when the present program is complete, it is questionable whether the channel black industry will ever be able to re-tool again unless new processes for making other types of black fail to make the grade with the tire manufacturers.

POSSIBLE IMPROVEMENTS

Technologically, the channel process has been thoroughly exploited. Innovations such as using partially cracked natural gas or operating a production unit under pressure can increase the yield of channel black. However, the plant investment required is so great that no such modification could be seriously considered unless there were no other means of producing suitable carbon black.

One other improvement in the channel black process is still possible: Further increases in the price of natural gas would permit enrichment with easily vaporizable aromatic hydrocarbons, similar to the processes employed in Germany. This operation was actually tested successfully in the United States during the war by one of the major carbon black producers. However, since enrichment is not readily accomplished without considerably modifying existing facilities, it is doubtful if enrichment in channel plants will be important in this country. On the other hand, it may make possible production of black in sufficiently high concentration in the waste gas to permit effective bag filter collection of waste black now lost, and thus increase yields.

It seems unlikely that new or greatly improved qualities of reinforcing channel carbon black will be developed from the present raw materials. There is, however, possibility of improvement in the handling and processing characteristics of channel blacks through installation of better pelleting equipment and improved bulk handling and transportation methods.



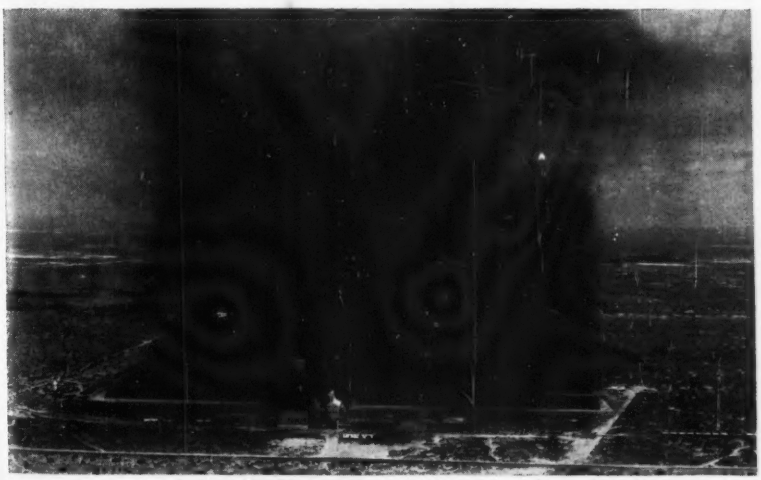
This figure includes thermal black.

FURNACE BLACK

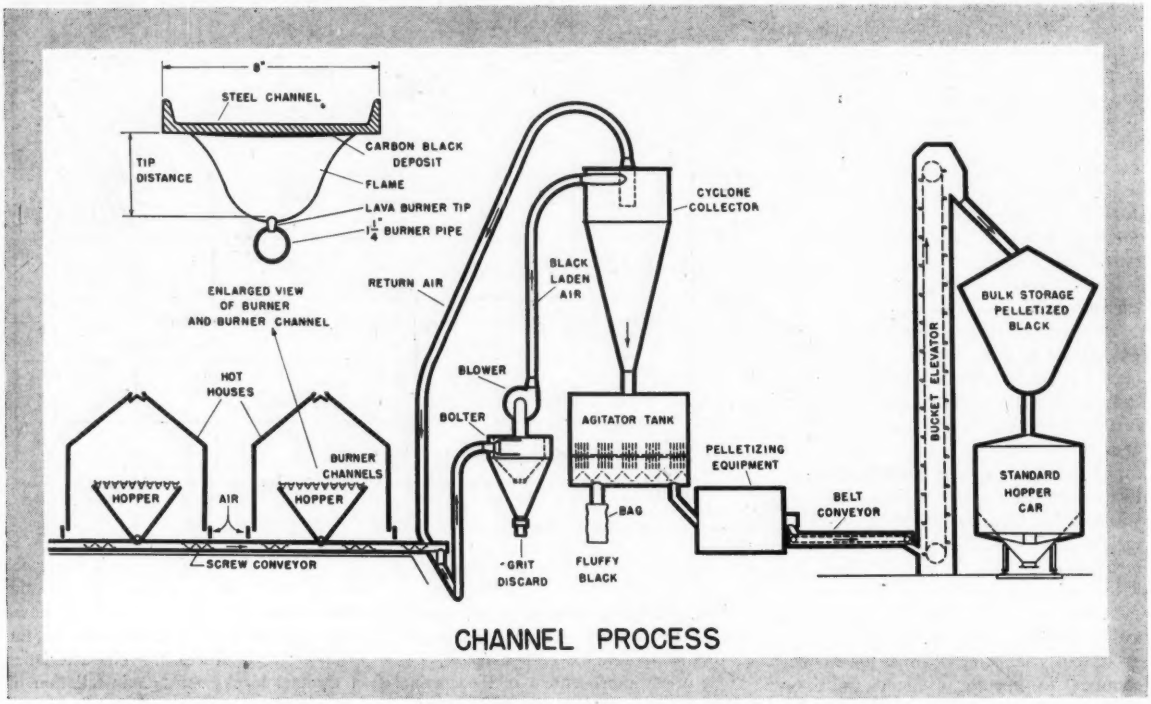
Furnace black is produced by a process differing considerably from the channel black process, although the actual mechanism of carbon formation from the flame may be quite similar. In this process all of the combustion takes place in a confined, insulated refractory chamber and the volume of air forced in is regulated to about 50% of that required for complete combustion. The carbon-producing flames within the furnace are large and in turbulent motion, in contrast to the individual small, thin flames burning in the relatively non-turbulent environment characteristic of the channel black process.

After combustion, the carbon-laden gases are led through flues to a spray cooling tower and to electrical and mechanical carbon black collecting equipment. The collected carbon is then pelleted and packaged. Most of the furnace black produced is coarser and less black than channel black. Nevertheless, wide variations in qualities can be produced.

Prior to World War II, furnace blacks were thought to be producible only in relatively large particle sizes, non-competitive with the much more reinforcing channel black. In 1942 the major producers of carbon black, influenced by wartime demand for furnace black to be used in synthetic rubber, began intensive development programs aimed at improving furnace blacks. Heretofore, the quality of channel black had set the standard for reinforcing pigments in ap-



Channel black plant in Southwest Texas. The cloud of smoke indicates the huge loss of carbon which is characteristic of the process.



CHANNEL PROCESS

plications where resistance to abrasion wear is important. In other properties, such as heat build-up in a rubber stock during processing, flex cracking of tread stocks and volume loading into rubber, furnace blacks have always been superior.

A principal variable influencing good road wear of carbon black-reinforced rubber tires is the particle size of the black. Accordingly, research has been directed mainly at decreasing the particle size of furnace black toward the channel black range. Today furnace blacks of even smaller particle size and possessing better reinforcement properties than some of the rubber-grade channel blacks can be produced from natural gas. The quality objective has been reached, but a corollary is also evident. As furnace black quality was improved, yields diminished almost in proportion; and, even more important, production rates per unit of furnace black equipment diminished faster. Thus while production of high-quality furnace blacks from natural gas has been achieved, the problem of deriving profit from the process has hardly begun.

One factor that has held back the economic development of reinforcing furnace black is the inability of the rubber industry and the carbon black industry to agree on the quality level that is necessary for furnace blacks. Economic production of fine furnace blacks requires additional and substantial capital expenditures. The carbon black industry must see a payout on this investment before new demands for even higher quality blacks arise. Since furnace black is already highly reinforcing, it is debatable whether further increasing its quality is as important as profitably producing it in large volumes at a cost to the consumer equal to or lower than present channel black cost. It is certain that if a fixed quality of reinforcing furnace carbon black could be set, the industry would be able to lower its cost.

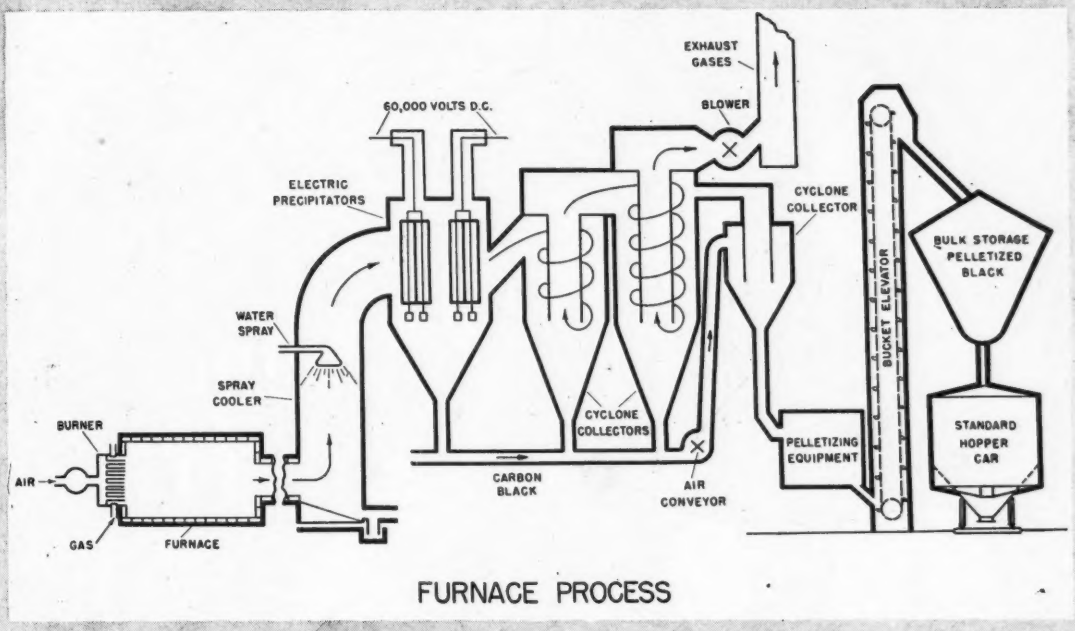
Development work has shown that the quality and yield of furnace black are almost completely determined within a few feet of the burner. The remainder of the furnace serves largely as a calcining chamber where tarry matter is distilled and cracked, and small amounts of residual methane is thermally decomposed to carbon black. Combustion with oxygen is complete, but the overall process does not have time to reach equilibrium before being quenched. Sudden cooling of the carbon-laden flue gases is accomplished with water sprays, and it is clearly recognized that an enor-

TABLE I—SOME MANUFACTURERS AND TRADE NAMES OF CARBON BLACKS

Type of Carbon Black	*Trade Name*	*Manufacturing Company*
Coarse Thermal	Thermax	Thermatomic Carbon Co.
Fine Thermal	P-33	Thermatomic Carbon Co.
Easy-Processing Channel Black	Spheron 9	Cabot
	Micronex W-6	Columbian
	Wyex	Huber
	Kosmobile 77	United
	Continental AA	Witco-Continental
Medium-Processing Channel Black	Spheron 6	Cabot
	Micronex	Columbian
	Arrow TX	Huber
	Kosmobile 66	United
	Continental A	Witco-Continental
Hard-Processing Channel Black	Spheron 4	Cabot
	Micronex Mark II	Columbian
	HX	Huber
	Kosmobile S	United
	Continental F	Witco-Continental
Semi-Reinforcing Furnace Black	Sterling S	Cabot
	Furnex	Columbian
	Essex	Huber
	Kosmos 20	United
	Continex SRF	Witco-Continental
High Modulus Furnace Black	Sterling L	Cabot
	Statex 93	Columbian
	Modulex	Huber
	Kosmos 40	United
	Continex HMF	Witco-Continental
Smooth Extruding Furnace Black	Sterling SO	Cabot
	Statex M	Columbian
	Philblack A	Phillips
	Kosmos 50	United
Fine Furnace Black	Sterling 99 and 105	Cabot
	Statex B and K	Columbian
	Kosmos 60 and 80	United
	Continex FF	Witco-Continental
Highly Reinforcing Furnace Black	Vulcan 1 and 3	Cabot
	Philblack 0	Phillips

Note: This table does not show all manufacturers and types of black but only the more important grades of carbon blacks for rubber.

Godfrey L. Cabot, Inc.
77 Franklin Street
Boston 10, Massachusetts
Columbian Carbon Company
41 East 42nd Street
New York 17, New York
Commercial Solvents Corp. (Thermatomic Carbon Co.), 17 East 42nd St., New York 17, N. Y.
Continental Carbon Co.
295 Madison Avenue, New York 17, N. Y.
J. M. Huber, Inc.
460 West 34th Street
New York 1, New York
Phillips Petroleum Company
Bartlesville, Oklahoma
United Carbon Company, Inc.
P. O. Box 1913
Charleston 27, West Virginia
Witco Chemical Company
295 Madison Avenue
New York 17, New York



FURNACE PROCESS

mous amount of heat is thus wasted. To prevent this waste, development work is being carried out on heat exchangers that will operate at the 2000° F level. Normal operation of such equipment is greatly hampered by the insulating characteristics of carbon black that unavoidably collects on heat exchange apparatus.

Production of high-quality furnace black at reasonable yields and production rates requires preheating natural gas before it enters the furnace. This may be accomplished by complete combustion of a portion of the natural gas, using the combustion products to preheat production gas by direct mixing. A second method of preheat is by heat transfer to the production gas from surface-type heat exchangers. It is not an easy problem to control the burning conditions in a furnace maintained at 2500° F when preheated gas in used, for, even though considerable improvement in yield and quality of black is attained, slight imperfections in the flow pattern of the flames cause hard coke-like carbon to form inside the furnace and on the burners. This condition impairs both yield and quality of the black.

A second method of making high-quality furnace blacks in reasonable yields and production rate is from oil or combinations of oil and gas. The earliest use of oil in making carbon black was in the lampblack process; using oil again may appear to be a step backward, since the lampblack process has long been regarded as antiquated. However, in the confined, rigidly controlled furnace black process, oil, because of its chemical nature and high vapor density, gives greater yields of black at a higher production rate for a given size plant than natural gas. Furthermore, oil gives quality characteristics unattainable from the lampblack process or from natural gas, unless the natural gas is preheated to an impractically high temperature. These factors, when taken together, indicate that oil blacks may be the high-quality furnace blacks of the future, and may even supplant channel blacks for all but very special small-volume pigment uses. If oil continues to advance in price, this prediction will not follow; natural gas will be the most economical raw material for highly reinforcing blacks.

Most processes employing oil in furnace black production use it to enrich natural gas or use it alone as a vapor. It is likely that heavy residual oils will be used in increasing quantity in carbon black manufacture since they are cheaper and more available than distillate oils. It now appears that processes using oil as a principal raw material will supply rapidly increasing quantities of highly reinforcing furnace blacks at about the price level of channel black. There are substantial indications that oil blacks and fine furnace blacks will perform better in synthetic rubber than will channel black. This seems to be particularly true in "cold rubber."

CARBON BLACK PROPERTIES

To the already large number of grades of channel black, there has been added an even greater number of furnace blacks. Addition of trade names has made the picture even more complicated as has the use of separate designations for pelleted, compressed, or fluffy form (Table I).

Essential differences between the many

(Turn to page 104)

TABLE II—CLASSIFICATION OF CARBON BLACK FOR RUBBER

		Increasing Rubber Reinforcement[1] →			
		Normal Structure		*High Structure*	
Particle Size (Millimicrons)	*Low Structure Neutral pH*[2]	*Low pH*	*Neutral pH*[2]	*Low pH*	*Neutral pH*[2]
Coarse 300–100	Coarse Thermal	None	None	None	None
Medium 100–45	Fine	None	Semi-reinforcing furnace black. High modulus furnace black	None	Smooth extruding furnace black
Fine 45–33	None	Easy processing channel black	Fine furnace black. Electrically conductive furnace black.	None	Fine furnace black
Ultra Fine 33—lower	None	Medium processing channel black. Hard processing channel black. Conductive channel black.	None	Low pH, highly reinforcing furnace black	Highly reinforcing furnace black

[1] *The term "reinforcement" is defined as resistance to road wear.*
[2] *These blacks may show alkaline pH because of contamination by alkaline salts from the process cooling water.*

Brown Instrument Co.

A continuous-process plant must pay more attention to accuracy of instrument recordings and their integration than with batch processes.

How Good INSTRUMENTATION Can Save Dollars: Part 2

by C. S. COMSTOCK*
Monsanto Chemical Company, Texas City, Texas

GOOD INSTRUMENT PLANNING requires the attention of properly trained instrument men during all phases of the project development — process and plant design, construction and operation.

THE ADVANTAGES of instrumentation were brought out in part 1; but it is patent that if the potential profits from good instrumentation are to be realized, selection of instruments and their application must be made an integral part of process design and for this the design department must have the services of suitably trained men. At present such men are scarce.

When the Texas City styrene plant was being designed, our design department had available a man who had been both a production supervisor and head of a plant instrument maintenance department. This man worked on process design and selected instruments, later supervised checking the general field installation of instruments, and organized and headed up the instrument department for the operating plant. This worked out very well. To develop more men of this kind, a young man who had considerable interest and experience in design work was made technical assistant in the instrument department at Texas City. When he was later transferred to the process design department, his training was of the greatest value.

The duties of a man so trained should not be confined to working with instruments. In an operating company it seems a mistake to specialize to such a degree. The bright, ambitious individual needed for this kind of job will soon become dissatisfied because he feels he will become so highly specialized that he cannot advance to greater responsibilities. On the other hand, a man who is content to remain may be too mediocre to be satisfactory. This of course is not intended to reflect on the profession of instrument engineering. The best place for advancement for a highly trained instrument man, though, is in an instrument company.

Process design men always need training in an actual plant and it now seems mandatory for some to have a couple of years in an instrument department.

PIPING AND INSTRUMENT DIAGRAM

Keystone of our process design is a "piping and instrument diagram." This drawing is one of the first made and must be prepared by the process department.

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* Dr. Comstock was in charge of engineering at Monsanto's styrene plant at Texas City until his death in the disaster of 1947. This article is based on the second portion of a lecture delivered by Dr. Comstock before the First Annual Short Course on Instrumentation for the Process Industries conducted by the Agricultural and Mechanical College of Texas, College Station, Texas.

Thanks are due Clyde W. Braswell of Monsanto for bringing the cost figures up to date.

It shows all equipment in outline and all piping and instruments by suitable symbols. Line sizes are specified, locations of orifice plates, thermocouples, and the like, are shown. (The location of an instrument on a panel board is shown by a double circle around the symbol.) All information necessary for mechanical design of an entire plant, except equipment specifications, is incorporated on this one drawing. This drawing enables the operating department to review easily the plant design and work out proper controls — valves can be sized and a good job done. It is usual for a single drawing to go through as many as 15 or 20 issues and revisions, but once all points are settled, piping drawings can proceed without subsequent correction.

By means of this revised drawing, the process engineer trained in instrumentation can study each application of an instrument to determine whether it controls the required variable. From this he can decide what instrument is required.

Sometimes the equipment can be modified to fit instrument characteristics. For example in the design of a certain absorber with a very high liquid downflow in which the flow from the bottom is to be controlled by a float mechanism, it was found that the holdup capacity in the bottom of the tower was so low per inch of float travel in comparison with the liquid throughput that smooth control was not possible. A surge drum mounted alongside the tower bottom provided the necessary regulation.

To simplify upkeep, the mechanical engineer should see that instruments are made accessible. Actuating devices should be reached by platforms; air lines and electrical leads should be grouped together with sufficient space allowed behind panel boards. A comfortable instrument shop should be provided — not a cubby-hole in one corner of the machine shop. Attention to such details greatly reduces operating costs.

For accurate measurements the design department must specify the minute details of installing instrument actuating devices. The inspection department must also check to see all specifications have been met.

IN OPERATION

Reliable and economic operation can be achieved only if the instrument services in the plant are well organized and supervised.

The proper functions of an operating instrument department are to:

1. Procure and train necessary personnel.
2. Adjust instruments to fit process characteristics.
3. Maintain instruments in good working order.
4. Assist operators in diagnosing process troubles.
5. Test the accuracy of instrument measurements.
6. Tabulate and calculate production charts and service distributions.
7. Study, revise and improve control operations.
8. Develop new instruments and applications.

TRAINING PERSONNEL

Because of the tremendous increase in instrument use, a company usually cannot find as many trained instrument mechanics as it needs. Texas City started operations sufficiently early in the program of plant expansion to form a nucleus of several well qualified men with previous training. Additions were made by selecting men on the basis of intelligence, mechanical ability, and interest in instrument work.

With a department built up in this manner, any needed replacements can readily be trained. Most experienced men who are shifting jobs are probably drifters or otherwise undesirable. Even though these men are technically qualified, they should be passed by in favor of inexperienced men with the proper aptitude.

A totally inexperienced man is best trained by working as an experienced man's helper for the first month. During this time the foreman coaches him on safe practices and general training, and his fellow employees gradually acquaint him with the terminology and general instrument operations.

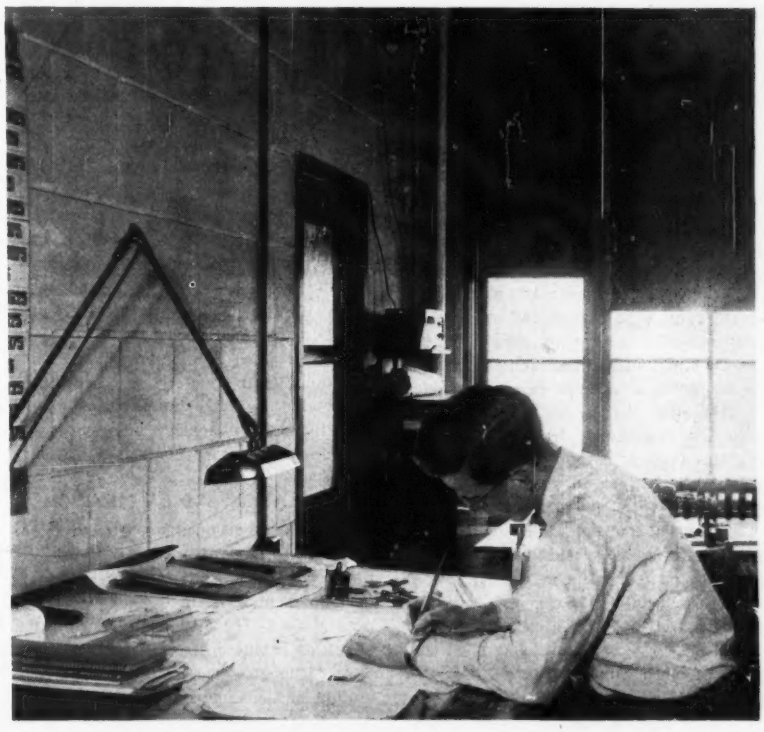
The trainee also receives a loose leaf notebook containing a service manual, which becomes the nucleus of his further training. The notebook contains sufficient information for all ordinary operations. If formal study is required before this induction period, all but the very exceptional man will be confused by the unfamiliar terms. The better men will start to study the manual; from the questions he asks, an alert foreman will know when it will be profitable to accelerate teaching.

The service manual contains copies of manufacturers' charts and service instructions on all types of meters used in the plant, complete with photostatic pictures. Sketches of installation piping for all types of orifice and seal pots used in the plant are included, with stepwise procedures for all regular service jobs on all instruments and valves.

Sketches and descriptions of all unusual or critical installations are shown. The manual also tells how to spot and correct the common troubles of the different types of instruments.

Putting a new man to work alongside of experienced personnel seems to give the fastest start, but at the best, such training is not complete. After a month, the instrument engineer and foreman begin a series of conferences on the various phases of instrument work with the men, singly or in groups of two or three.

Entire instruments are discussed as a unit. Operation of control valves and valve actuating mechanisms are early sub-



A "piping and instrument diagram" is the keystone of process design. From the completed diagram can be determined whether each instrument application fits the required variable.

jects. Pressure gauges are studied, but automatic control instruments are not taken up until actuating mechanisms are thoroughly understood.

The instrument foreman is the key. He continually checks the performance of all trainees. If the service call record indicates considerable time spent on one instrument, or repeated calls for the same instrument, he investigates the difficulty. Troubles are discussed with the men and good cooperation has been secured since criticism has been kept on a constructive level.

Every three months the foreman fills out complete rating sheets on all his workers. Ratings are made on the basis of job knowledge as well as the less tangible characteristics of attitude toward the job and fellow workers, dependability, and the like. These ratings bring out problems of individuals and dictate specialized programs of instruction to suit each case.

Because of the small number of employees in an instrument department, generally individual training is most efficient. This, of course, presupposes an alert foreman who can fit the program to individual capabilities.

Training an instrument man to diagnose trouble without wasted time and to know when the instrument is correct and the process wrong is the most difficult and time-consuming part of the training. Such a program is never finished.

ASSISTING OPERATORS

Instruments are part of the process, and any process unbalance immediately involves unbalance in the instruments; conversely, any faults in operation of instruments are immediately reflected in production. Since the average operator is not trained specifically in the mechanics of instruments and since instrument mechanics often have had no operating experience on process work, a nice balance in duties and responsibilities is necessary. A spirit of mutual cooperation must be achieved to diagnose troubles quickly as to source, so that operators will not blame faulty instrument performance — or the instrument man, faulty operations — for what are really mutual troubles. A good deal of the success of a good instrument department depends on achieving this cooperation.

MAINTAINING ACCURACY

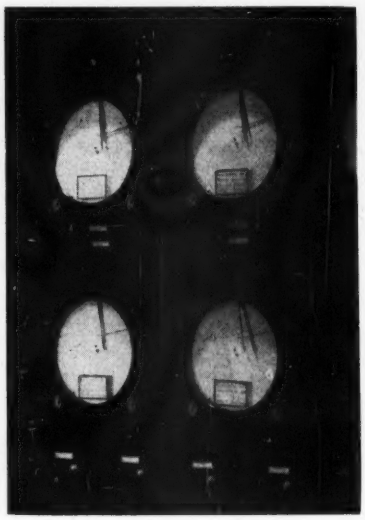
The instrument department is responsible for determining and maintaining the accuracy of instrument measurements. A regular schedule is developed to insure the greatest possible accuracy. Orifice plates are inspected and "miked" in conjunction with equipment inspections.

On the critical material balance flows at Texas City, a regular weekly inspection is made covering the following points:

1. Zero reading of meters checked; also levels of the sealing liquid where used.
2. Accuracy of the pneumatic transmitting system in duplicating meter differentials on the control board.
3. Accuracy of pressure measurement.
4. Accuracy of temperature measurement.

A monthly water column calibration is made on each meter involved in the material balance.

Such precautions have resulted in product metering sufficiently accurate for operational control. All results indicate an



accuracy between 1% and 3%, a performance that will probably be improved.

In general, an instrument department in a continuous process plant must pay a great deal more attention to accuracy of instrument recordings and their integration than has often been the case with batch processes. There all process yields, including yields of strategic intermediate steps, could be determined by tank depths and the like.

On the other hand, continuous processes often have no measure on many recycle streams and intermediate products other than a meter. But with proper installation and maintenance, standard flow meters can achieve sufficient accuracy for satisfactory control.

TABULATION AND CALCULATION

Since the instrument department is responsible to the operations for the operation of all instruments, instrument department personnel change charts and ink pens daily. These charts are collected and filed in the instrument shop. Each day instrument department clerks average or totalize the required chart records and present a typed daily performance record to each operating supervisor.

Inspection of the charts during this process leads to quick detection of uneven or faulty instrument operations. Faulty pen impressions can easily ruin the value of instrument records. By having trained personnel change and collect the charts, operators have no occasion to adjust pens, and temptation to meddle with the instrument mechanism is considerably lessened.

REVISION AND IMPROVEMENT

No matter how good the design of a plant, perfection is never achieved. The instrument engineer spends a good part of his time improving plant control methods. In general these improvements tend towards making better use of existing equipment, particularly in making control more automatic. For instance, on a distillation column, a more or less standard set of instruments may be arranged to control in various ways. Depending on conditions, various methods are better on different services.

With charts of plant operations always at hand, the instrument engineer can study the records and find out where control needs to be improved. Close cooperation with the operating supervisor pays off in uncovering likely targets for improvement.

Despite the wide variety of instruments in regular manufacture, needs arise for new methods of control. Suggestions for such control come from research, operations, and the instrument department. Close cooperation is achieved with research. Since the instrument department has precision machine tools, it is equipped to develop new instruments. Such research problems add interest to the work of an instrument engineer and to the mechanics, and are well worth while. If an instrument is developed which has general application and which fills a need, some instrument manufacturer can usually be found who will undertake fabrication of additional units.

DEPARTMENT ORGANIZATION

Close cooperation with production is needed in all the various duties of the instrument department. Accordingly, this department is included as a subdivision of the operating department under direct control of the production superintendent, rather than under the maintenance department. It thus fills a position somewhat parallel to that of the analytical control laboratory. This has served admirably at Texas City and is recommended for consideration by others.

The instrument department organization at that plant must handle approximately 1,000 control instrument units, 800 of which are pneumatically operated. It consists of a production superintendent, an instrument engineer, five chief instrument men, a yield supervisor, five instrument men and two clerks. Total costs for a year's operation are approximately $65,000.

Elliott Co. solves waste disposal problems at main plant, Jeannette, Pa.

Process Revision Gives Low-Cost Waste Disposal

by C. F. HAUCK and L. C. BISHOP
Hall Laboratories, Inc.
Pittsburgh, Pa.

OILS, PICKLE LIQUORS, and cyanide-containing wastes disposed of at low cost by Elliott Company at Jeanette, Pennsylvania.

THE factory manager faced with the task of "cleaning up" waste waters to avoid pollution of public streams need not assume that the job always will be costly. Institution of plant-wide housekeeping improvements and full use of existing plant equipment have often proved that pollution abatement can be effective without operational interruptions or a major outlay of funds.

An example of efficient handling of a complex waste disposal problem is the plant-wide program currently under way at the Jeannette, Pa., plant of Elliott Co., producers of turbines, condensers, superchargers, centrifugal blowers and other plant processing equipment. Several contaminants required disposal. They included soluble and lubricating oils, waste pickle liquor and rinse water, and cyaniding quench waters.

From the outset it was apparent that each would require individual handling; yet a plant survey showed that careful planning and a modest expenditure would enable the company to meet local anti-pollution regulations by preventing contamination of near-by Bushy Run, which receives the plant's two waste water flows.

OILS

First offenders dealt with in the program, which is now nearing completion, were soluble and lubricating oils. It was determined that shop workers were permitting these oils—mainly from compressors, steam turbines, and gear boxes of production machine tools, plus spoiled coolants used by production and precision machine tools—to pass into floor drains leading to the plant sewers. Drip receivers were installed, and the oily waste collected now is dumped on the coal stockpile and burned. A skim baffle was installed on the spray pond to permit disposal of floating oil in a similar manner.

A third step was the shaping of an earthen basin at the sewer outfall to act as an oil trap in case of accidental oil spills. Finally, provision was made in the plant maintenance work schedule for separate collection of waste soluble oils and disposal on the coal stockpile.

PICKLE LIQUORS

Waste pickle liquors are neutralized in the pickle tank by periodic additions of alkali, with sludge disposal in a lagoon on plant property nearby.

Two underground oil storage tanks, no longer used for their original purpose because of a recent change in fuel, permitted economical disposal of rinse water. The water is automatically neutralized during operation and piped to the tanks. One tank has been adapted for sedimentation and withdrawal of neutralized rinse water through a swing pipe; the other concentrates and stores sludge produced by neutralization of rinse water. Each morning the swing pipe skims off the supernatant (clear liquid) which is disposed of in the plant sewage system.

Neutralization of rinse water was accomplished by a branch line installed between the inlet valve and the tank. An eductor is in this branch line, which feeds alkali to the rinse tank discharge. Thus whenever the inlet valve of the rinse tank is open, alkali is automatically fed to neutralize acid drag-out.

CYANIDE WASTES

Care in rinsing, segregation of cyanide rinse water, and separate disposal, proved to be a different problem but not costly or difficult. Formerly, small parts of turbine governors were dipped in cyanide salt baths, and quenched in a continuous stream of water. Normal volume of this operation was about 200 pieces per month. It was found that the continuous overflow contaminated the main body of plant waste water (which averages about 300 gpm). This necessitated a switch from continuous rinse to batch rinse. This in turn made possible minimization and segregation of the noxious waste for separate disposal. Total cyanide-containing waste disposed of averages about five gallons per day, six days per month.

Finally, it was determined that sodium dichromate, formerly employed to prevent corrosion in cooling water circuits on the Elliott dynamometer stands, was rendering plant waste water toxic. In this case Calgon—a special phosphate glass which is non-toxic—was substituted for the dichromate.

By these changes in operating procedure and employment of available facilities, major expenditures for oil separation, waste liquor neutralization and cyanide treatment facilities were avoided.

FIGURE #1
TYPICAL BRINE WELL

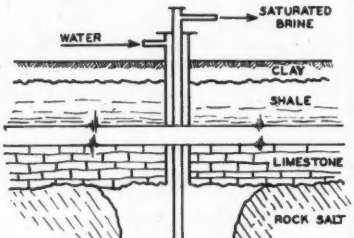
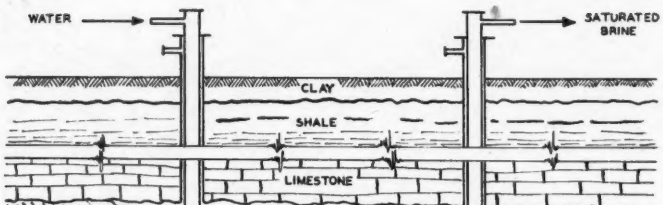


FIGURE #2
ADJACENT BRINE WELLS
AFTER FORMATION OF
PASSAGEWAY BETWEEN WELLS



How Operating Procedure AFFECTS SALT WELL COSTS

by C. A. BUTLER, JR., Director of Engineering
Diamond Alkali Company
Cleveland, Ohio

MAINTENANCE COSTS are the major expense in salt wells—source of most of the chemical industry's sodium chloride—and depend largely on the shape of the well cavity. Here is a comparison of cavities formed and brine produced by various procedures.

BY FAR the cheapest method of producing sodium chloride is to drill a well into a deposit of solid salt (Halite), inject water into the well, and remove the brine formed by dissolving the salt underground. This is the method by which 75% of all the salt produced in this country and 87% of that used in the chemical industry (about 10 million tons per year) is obtained.

From the tremendous amounts consumed, the importance of sodium chloride as a basic raw material in inorganic chemistry and of its constituents, sodium and chloride, in organic chemical reactions, is evident. How cheaply this salt is obtained from wells depends upon the nature of the deposit, the degree of saturation required in the brine, and the method of operating the well.

In a typical salt well operation, the cost of maintenance and depreciation on the wells themselves is 70% of the cost of producing the brine. A very important factor in this high maintenance cost is the shape of the cavity made by dissolving the salt.

One method of learning the most desirable cavity and the means of operating a well to give that shape of cavity, would be to determine the shapes of the cavities in existing wells by geophysical methods. Even if the complete histories of a necessary number of wells were available, this method would be expensive and time-consuming. Instead, the author, from a background of well-known theories of salt well operation and operating experience, including that of others, has reached his conclusions on salt well operating procedure by laboratory test rates of diffusion of salt from brine into fresh water, and from scale models of salt wells.

CONVENTIONAL SALT WELL

A conventional salt well (Figure 1) consists of a casing set in an impervious strata overlying the salt deposit, and an internal tube extending through this casing to the depth to which the salt is to be removed. If water is forced into the annulus between the casing and the tubing, and brine removed through the tubing, the well is said to be operated according to the "Top Water Injection Method."

If the water is forced down the tubing to the bottom of the strata being dissolved, and the brine removed through the annulus, the well is said to be operated according to the "Bottom Water Injection Method." In either case it is usual to inject the water at sufficient pressure to force the brine to the well head without well pumps.

Figure 2 represents the conditions existing when, after a considerable time of operation, a passage forms between adjacent wells. The usual practice is to install tubing as large as can be passed through the casing, thus making the annulus useless; and to pump water down one well and take brine from the other. Sometimes the tubing is removed from the well used to supply the water, though this is not good practice. When repairs are made to either well, both are out of service.

When a number of wells becomes connected by passages through the salt, it is impractical to lose the production of the whole group of wells whenever one of them is undergoing repairs. Under such conditions it is usual to reduce the pressure of the water supplied to the cavity to a value insufficient to force the brine to the well head, and to remove the brine with air lifts or deep well pumps.

Even with a thick hard rock strata overlying the salt bed, there is a limit to the amount of support which may be

Based on a paper presented at the American Institute of Chemical Engineers Cleveland meeting, May, 1948.

removed without causing crumbling of the cavity roof. Falling sections of roof are quite likely to damage the well tubing. This factor is much more important where there is a weak roof material such as shale or sandstone. As in any other mining operation, the remaining roof support must be sufficient to prevent troublesome subsidence of the surface of the ground.

In a properly designed well, there is little danger of damage to the well casing, except for corrosion; but in spite of all precautions, there will be falling rocks which will break tubing; drilling tools may be lost in cleaning out the well; and there may be a lot of debris in the bottom. It is expensive to remove such debris; it is much better to have a cavity at least a hundred feet in diameter at the bottom so that the debris can be allowed to accumulate without interfering with operation and maintenance.

The simplest possible salt well operation consists of pumping fresh water into the cavity and taking the brine out at the maximum rate that brine of the desired strength is produced, or at the rate of use. The introduction of additional factors, such as air blankets, extra strings of tubing, deep well pumps, etc., complicates the control and is therefore undesirable, though sometimes necessary. The existence of more than one well in the same cavity tends to complicate operation and maintenance, and adversely affects the firm capacity of any given group of wells. For this reason it is desirable to space and operate the wells so that maximum tonnage of salt is dissolved before adjacent wells form a common cavity.

The cavity which will most nearly approach all of the desirable features is a bottle-shaped cavity. A cylindrical cavity is a close second choice. A "morning glory" cavity is very undesirable, although it is probably the shape usually formed.

As will be shown later, the productive capacity of a well decreases rapidly as saturation is approached. Furthermore, saturated brine gives trouble due to crystallization in tubing, pipe lines, etc. Many processes do not require saturated brines. For instance, in the operation of diaphragm-type chlorine cells, unsaturated raw brine may be used, because after purification, the cell feed may be saturated with the salt recovered in concentrating the caustic soda solution from the cells. In general, operation at the minimum concentration at which the brine can be utilized without increasing processing cost will result in best well operation.

TRUMP METHOD

The only previous work on the control of cavity formation in salt wells with which the author is familiar, is described in the works* of the late Edward N. Trump, a pioneer in the alkali industry. The method of control proposed by Mr. Trump consists of "the maintenance of a layer of air, gas or other fluid medium which will float on the liquid protecting the roof of the cavity and preventing the liquid from coming in contact with it. This layer is formed by introducing the medium so as to force the liquid down to the desired level and to provide a surplus over the volume of medium so required which will be absorbed by the liquid so that the escape of the surplus will automatically control the level. The level can also be controlled by the pressure of medium in the cavity."

* A paper presented before the American Institute of Mining and Metallurgical Engineers in 1944, entitled "Mining Soluble Salines by Wells", and his disclosure in U.S. Patent No. 1,923,896.

The author does not entirely agree with Mr. Trump's conclusions regarding shape of cavity formed by conventional well operation. But his method is very ingenious for solving the particularly tough situation at Syracuse where he had to cope with a shale roof over the salt deposit.

DIFFUSION OF BRINE

Diffusion tests demonstrate that a layer of fresh water if laid down carefully over a layer of saturated brine shows no measurable diffusion of salt from brine into water at the interface even after a period of six days. On the other hand, it is impossible to lay down saturated brine over fresh water or to introduce a layer of fresh water under a layer of saturated brine. Diffusion of sodium chloride upward is so slow that it may be considered negligible in analyzing well operation, and there is no such thing as true downward diffusion because of mixing of the brine and fresh water due to difference in gravity.

Extensive laboratory work has shown that horizontal diffusion of salt from brine into fresh water varies with the concentration of the brine. For example, the rate of diffusion of a saturated brine solution into fresh water in a tube of 11 mm. inner diameter is several hundred times the corresponding rate when the solution contains only 100 grams of sodium chloride per liter. Although diffusion from saturated brine into partially saturated brines in more pertinent to actual well operation, it is clear that an increase in brine concentration gives an increase in horizontal diffusion into less concentrated solutions.

From these factors, one would expect that with the top water injection method

FIGURE 3
PROGRESS OF CAVITY IN WELL
USING TOP INJECTION

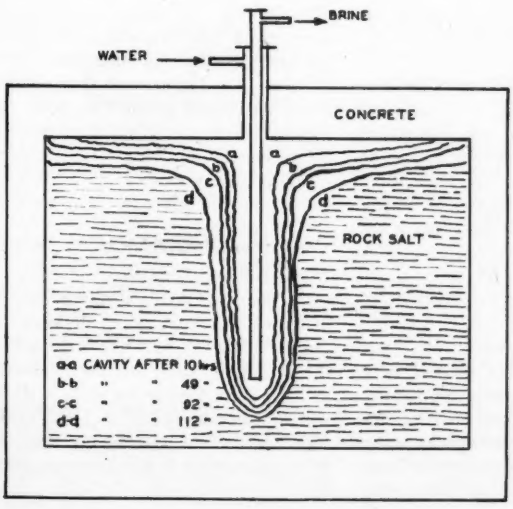


FIGURE 4
PROGRESS OF CAVITY IN WELL
USING BOTTOM INJECTION

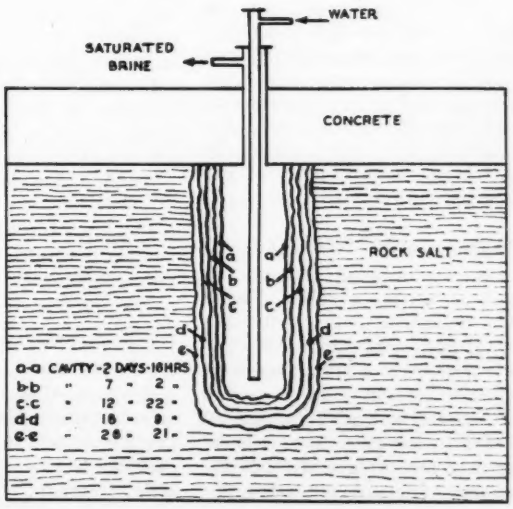
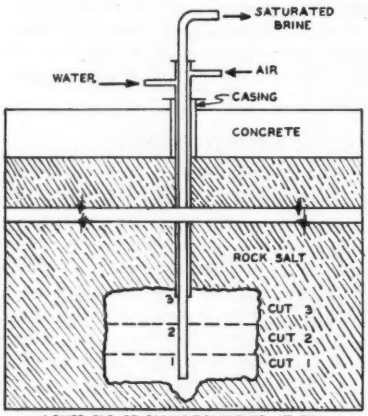


FIGURE # 5
PROGRESS OF CAVITY IN WELL USING "TRUMP" METHOD



LOWER END OF CASING POSITIONED AT PTS 1, 2 & 3 FOR SUCCESSIVE CUTS.

the top of the cavity would be large as compared with the average diameter, that the density of brine would vary from weak to strong with depth below the top of the cavity, and that there would be no circulation of liquid within the cavity except for the extremely slow flow from top to bottom caused by withdrawing brine through the tubing.

With the bottom water injection method, one would expect that fresh water introduced through the tubing would rise along the outside of the tubing and pick up salt, not directly from the walls of the cavity, but by diffusion from brine surrounding the rising water. Due to the rather slow rate of horizontal diffusion, one would expect at any place in the cavity where the salt was closer than the average to the tubing, that salt would be attacked more rapidly than average except at the top of an extremely high cavity where brine was not being withdrawn as fast as it approached saturation. One would also expect slow natural circulation of brine stored in the cavity up the center and down along the cavity walls. The net results expected would be a cavity essentially cylindrical in shape if the brine were withdrawn at a rate which would leave the brine below saturation, even by a very slight amount; if the well were operated at a rate below the maximum at which substantially saturated brine could be produced, one would expect a bottle-shaped cavity.

MODELS CHECK PREDICTIONS

To determine whether the expected shapes of salt cavities would be obtained in actual operations, model wells were constructed from large blocks (36" x 34" x 20") of quarried rock salt. These were encased with concrete where necessary and provision was made for a photographic record of cavity formation. Data from the pictures have been incorporated into the accompanying diagrams illustrating the progress of cavity formation in the various model wells tested.

Figure 3 shows the progress of the cavity in a well using the top injection method. Note that the width of the cavity in the top would have eaten through the salt block in a very few hours if it had not been encased in concrete.

Figure 4 shows the progress of cavity formation with the bottom injection method. Note that the cavity retained its nearly cylindrical form throughout the tests.

Figure 5 shows formation of the cavity in the test well constructed according to Mr. Trump's ideas. The cavity forms almost exactly as he describes in his writings.

CAPACITY DIFFERENCES

In all these tests, wells were operated at the maximum flow at which saturated brine could be taken from them. Capacities of the wells varied widely with the top injection wells by far the best. In comparison, assigning the value 100 to the capacity of these wells, Trump wells are next at 60, and bottom injection wells lowest at 12. Although the low capacity of the bottom injection well which showed the most desirable form of cavity is disappointing, this capacity increases with decrease in concentration of brine taken from the well. For example, the capacity of a well operated in this manner can be increased 14 times by reducing allowable salt content of the brine from saturation (311 g.p.l.) to 270 grams per liter. Many operations, as previously noted, are better served by withdrawing brine of lower concentration from the well, and this requirement will raise the capacity of wells so operated to an economical level.

In order to make sure differences in the structure of various salt blocks had no effect, a well which had been operated for more than one month as a bottom injection well was changed to top injection operation. This block of salt was not encased in concrete and after six hours' operation by top injection, water broke through the side of the block just under the concrete cap.

In order to further check these theories involving the mechanism of bottom injection operation, water was introduced into a well 2" from the bottom and brine withdrawn from the well at the bottom of the cavity. The brine was saturated, confirming the contention that fresh water introduced into the bottom of the cavity rises rapidly along the tubing.

As a further check of the existence of circulation in a bottom injection well, an indicator was added to water introduced into such a well so the diffusion of fresh water in the brine cavity could be observed. Colored feed water entering the cavity near the bottom rose upward along the tube. Near the top of the cavity, color diffused outward toward the sides, then spread down very slowly along the walls of the cavity.

From the above it is seen that every point in the theories developed from diffusion tests was checked by the performance of the model wells.

CONCLUSION

Operation of the model wells proves that the method of introducing fresh water into the salt stratum has a decided effect on the shape of the cavity formed. Which is the most desirable method of operating a salt well is dependent on (a) thickness and depth of the salt bed, (b) character of the strata overlying the salt deposit, and (c) degree of saturation required in the brine.

The top injection method, most commonly used, will produce the greatest capacity of saturated brine from a well in a comparatively shallow salt bed but is likely to produce difficulties due to caving, accumulation of debris around the bottom of the tubing, and rapid spreading of the top portion of the cavity. Where the top injection method must be used, it is necessary to operate the well at partial saturation by the bottom injection method for several months prior to its being placed in regular operation in order to provide some width at the bottom of the cavity. This procedure is very desirable even though the weak brine must be wasted; but usually the salt in this brine may be saved by using the weak brine as liquid supply to another top injection well.

The bottom injection method produces a cavity that requires minimum of operational expense and is very desirable in thick salt beds or where brine not more than 90 to 95 per cent saturated can be utilized. However, in thin salt beds where saturated brine is required, the capacity of a well operated by this method is too low to be economical.

The Trump method is somewhat complicated, especially in deep wells where air pressures involved are tremendous. Capacity of a well operated by this method is somewhat less than the same size well operated by the top injection method. However, the Trump method has its place where the strata is too thin to be operated by the bottom injection method, and is overlaid by a caving formation which tends to form a more or less impervious blanket on the surface of the exposed salt.

ACKNOWLEDGMENT

The author wishes to acknowledge the work done by William Armstrong, formerly of the development division, Diamond Alkali Co. and now a member of the technical staff of the Painesville Works, in conducting the model well tests and the work of D. D. McCormick, superintendent of wells in the Painesville Works, in aiding in the direction of these tests.

A CI REPORT ON

FLUORINE IN INDUSTRY

Part 2: Industrial Fluorine Chemicals

by G. C. FINGER* and F. H. REED†

THE INDUSTRIAL CHEMISTRY OF FLUORINE is—compared with other areas—virtually uncharted territory; and as a result many groups of researchers are finding it a fertile field for exploration. The authors delineate the present status of industrial fluorine chemicals and predict a further rapid expansion—particularly in the organic field—over the next few years. From this point of view the economics of fluorine sources, discussed in Part 1, takes on added significance; for the ultimate impoirtance of the industry depends on adequate raw material supply.

THE ADVENT of Freon refrigerants in 1930, the appearance on the American market of certain brilliantly colored German dyes several years later, and World War II with its "atom" bomb, "bug bombs," HF alkylation process for 100-octane aviation gasoline, etc., has attracted wide attention to fluorine.

It is widely distributed in the earth's crust[8] to the extent of about 0.03 per cent. This low percentage makes it appear that it might be a rare element. Quite to the contrary, it is 3, 15, and 30 times as abundant as copper, lead and cobalt, respectively, and two-thirds as abundant as chlorine.

The chief fluorine-containing minerals of commercial significance are fluorapatite (rock phosphate), cryolite, and fluorspar. There are several miscellaneous fluorine minerals such as amblygonite, $AlPO_4$ LiF, and lepidolite, $KLi[Al(OH,F)_2]$ $Al(SiO_3)_3$ containing 13.5 and 9.5 per cent of fluorine, respectively. They are of no importance to the fluorine chemical industry, and are used solely in the ceramic industry or as a source of lithium.

The most important fluorine-containing mineral in industry today is fluorspar. In general, fluorspar is associated chiefly with limestone, sandstone, or igneous rock; the latter type is the most difficult to process. Other minerals commonly found with it are galena, sphalerite, calcite, barite, etc. Since the Illinois-Kentucky fluorspar generally occurs in beds of limestone or sandstone, it can be processed readily to a high-grade product unmatched in quality by a quartz matrix type.

Since 1936 the chemical industry has not only established itself as the second largest consumer of fluorspar but has had a profound effect upon the technical development of the fluorspar industry in general.

While the chemical industry was increasing its acid spar consumption from 20,000 tons in 1936 to a phenomenal demand of 129,000 tons in 1944, the fluorspar industry became aware that here was an almost ideal type of customer from the standpoint of economic stability.

CHEMICAL SPAR

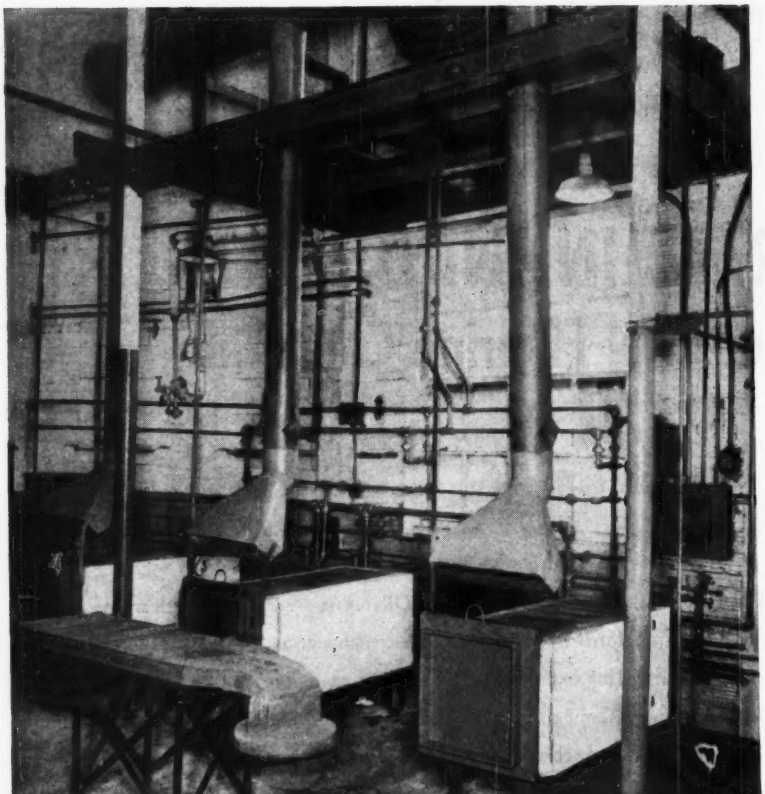
Fortunately, the Illinois-Kentucky fluorspar interests met this challenge in a most positive way by installing suitable equipment and thus becoming the world's outstanding producers and processors of high-quality acid spar. Circumstances are such now that the chemical industry need not hesitate to base its developments on a uniform and constant quality of raw material.

The chemical industry requires a high quality fluorspar with a maximum calcium fluoride content and a minimum of silica and calcite. This grade, acid spar, is used in the manufacture of hydrofluoric acid.

Fluorspar or calcium fluoride is quite inert chemically and thus is not used directly in many chemical operations. The chemical industry circumvents this difficulty by treating the acid spar with sulfuric acid to form hydrofluoric acid. This acid has many desirable features: (1) by weight it contains 95 per cent fluorine, (2) its fluorine is readily available for many chemical reactions, and (3) it is a very useful chemical in many nonfluorinating types of reactions. The summation of these features is reflected in the fact that hydrofluoric acid is now considered a major industrial chemical.

Recently a new process has been announced that avoids the usual hydrofluoric acid route of winning the fluoride values from fluorspar. In brief, the process involves the interaction of fluorspar, sulfuric acid and boric acid in an aqueous medium to form fluoboric acid (HBF_4). A low-grade of fluorspar may be used. The fluoboric acid can be used as such or

* Chemist and Head, Fluorspar Division, and † Chief Chemist, State Geological Survey, 100 Natural Resources Bldg., University of Illinois Campus, Urbana, Ill. Reprints of this Report will not be offered since the bulletin on which it is based will be distributed free of charge by the Survey about February 1.



Cobalt trifluoride generators at Hooker Electrochemical Co. This material is the actual fluorinating agent for many processes, reverting to the difluoride which is regenerated.

converted to fluoborate salts, or used in the production of synthetic cryolite.

The miscellaneous uses of fluorspar are rather numerous. A small amount of fluorspar is used in the electrolytic cells in the manufacture of aluminum. The magnesium industry requires a small amount to satisfy its special needs. It is used in the manufacture of calcium carbide and cyanamide to facilitate the fusion and contact of ingredients. Occasionally some is used in the clinkering process for the manufacture of cement, and the rock wool industry in certain instances requires a small amount to reduce the viscosity of its rock melts. It is used as a paint pigment, as a binder in abrasives, as a mineralizer in certain ceramic operations, in the manufacture of carbon electrodes, as a catalyst, welding fluxes and rods, and heat resistant brick. Since a very small amount of fluorine prevents dental caries, some new dentifrices contain some fluorspar.

A clear and colorless fluorspar called optical spar is used in various optical instruments because (1) it has a low index of refraction, (2) it has a high transmissibility to light, especially to ultra-violet, and (3) it displays no double refraction. Due to the great scarcity of natural optical material, a process for the production of synthetic crystals of fluorspar has been developed.

MAJOR FLUORINE COMPOUNDS

Any attempt to compile an extensive list of fluorine chemicals in the order of their relative economic importance would be almost impossible. The reason for such a situation is the lack of statistical information, and the reluctance of manufacturers to release production figures for competitive reasons.

However, a few isolated facts stand out from which deductions can be made as to the major fluorine chemicals: Approximately 90,000 tons of acid spar valued at $3,500,000 was shipped from the mines for the manufacture of hydrofluoric acid and derivatives in 1947. The production of anhydrous and technical hydrofluoric acid for the same year was about 27,000 tons.[22] As early as 1944, plant construction facilities were underway to achieve a monthly production of 2,400 tons of Freon. The Manufacturing Chemists Association[7] reported a 1944 domestic production of over 10,000 tons of sodium silicofluoride.

These facts not only speak for themselves as to the stature of certain fluorides, but also give the market analysts an opportunity to speculate on the value of the entire fluoride industry.

The largest production of any fluorine chemical is represented by hydrofluoric acid. This acid is one of the most unique chemicals in industry for two reasons: (1) it is a key chemical in almost all fluorine chemical processes, and (2) it finds extensive application in non-fluorinating processes as a catalyst, reaction medium, etc. Hydrofluoric acid production in 1944 reached its peak production of 45,700 tons (calculated as 100 per cent HF). The relaxation of war demands caused a recession in hydrofluoric acid production to a low of 21,000 tons in 1946, but its recovery since then has been steady as indicated by a production of 3,000 tons in August, 1948.[25]

All indications are that this is a steady recovery due to greater diversification of uses and the development of new products in the offing. Anhydrous hydrofluoric acid of over 99 per cent purity is available in carload lots at a current price of 16 to 16½ cents per pound (November, 1948).

Two types of hydrofluoric acid are commercially available: aqueous acid and anhydrous. From a chemical standpoint, these two products exhibit marked differences in properties and may be considered as two different types of chemicals. Both are made by the same basic reaction, namely by the interaction of acid spar with sulfuric acid in suitably heated kilns:

$$CaF_2 + H_2SO_4 \longrightarrow CaSO_4 + 2HF.$$

The manufacture of aqueous acid preceded the production of the anhydrous product by many years. The hydrogen fluoride gases from the preceding reaction are absorbed in water in suitable lead cooling and absorbing towers. By recycling the absorption liquors, various strengths of acid can be obtained. Occasionally certain strengths are redistilled to give a higher quality acid. The usual strengths are 30%, 40%, 48%, 52%, and 60%; other strengths are available upon contract specifications. Those acids below 60% are generally shipped in lead or hard rubber containers, whereas 60% or higher may be handled in steel. More recently, the trend has been to dilute the anhydrous grade to the desired strengths. This arrangement is much more convenient as the anhydrous product can be stored in steel.

ANHYDROUS HF

Anhydrous acid is made by the same general reaction, but under more rigidly controlled conditions[3,6]. The retort is a large revolving steel kiln which is heated at 300-800°C. Finely ground acid spar is mixed with a slight excess of sulfuric acid in a hopper and then fed into the kiln. A large vent pipe serves as a collector for the HF and other gaseous products. At the far end of the kiln, the by-product calcium sulfate is usually expelled by a screw drive into water.

The vent gases are passed countercurrently into sulfuric acid absorption towers. Some of the HF, some water, and most

of the SO_2 and SO_3 are absorbed in the sulfuric acid. The sulfuric acid builds up in HF content, and the HF is recovered by heating. Both the recovered and the unabsorbed HF are combined and distilled through suitable columns.

Besides the anhydrous HF (b.p. 19°C) which is condensed to a liquid by a refrigerating system, an aqueous residue is obtained also. The SiF_4 formed from the silica present in the fluorspar passes through the entire system as a gas. The aqueous residue is fortified with sulfuric acid and returned to the scrubbing towers.

The silicon tetrafluoride gas (SiF_4) is passed into water absorption towers to form fluosilicic acid (H_2SiF_6). It is because of this by-product that hydrofluoric acid manufacturers prefer a low silica fluorspar as it minimizes the loss of available fluorine. The fluosilicic acid derived from this source is channeled into industry in the same manner as the by-product acid derived from phosphate fertilizer plants.

Formerly, the type of equipment and the handling of hydrofluoric acid or its anhydrous product was of serious concern to the industry. Remarkable strides have been made in handling such a corrosive product so that all the operations are now within the realm of engineering materials well known to the chemical industry.

Concentrations of acid above 60% can be conveniently handled in iron as well as magnesium, copper, monel, nickel, and brass. Lower acid strengths find lead a suitable engineering material. Bakelite, wax, hard rubber, and various plastics, such as polyethylene, are used also for container fabrication.

ACID USES

The uses of aqueous and anhydrous acid are many, and it is difficult to determine the consumption, value and all of the specific uses for each type of acid. The Bureau of Census, Chemicals Unit[25] reports the production of the acid on a 100 per cent HF basis and does not differentiate between the types of acid. In 1944 about 50 per cent (24,900 tons)[24] of the total acid production (45,700 tons as 100 per cent HF) was earmarked as anhydrous acid. Indications as of 1948 are that more anhydrous acid is being generated than aqueous. This agrees with the fact that the industrial trend is toward anhydrous acid with subsequent dilution to the desired aqueous strengths.

Large tonnages of anhydrous HF are used in the production of "alkylate" for the manufacture of 100-octane aviation gasoline, and the Freon refrigerants. These items together undoubtedly account for the major consumption of the anhydrous product.

Due to the development of HF-alkylation by Universal Oil Products in 1942[13,15], the wartime demand for HF, in order to start the new plants using this process, was very large. The HF functions as a catalyst for the conversion of olefins and isoparaffins into a mixture of isomers of heptane, octane, etc. Unconfirmed reports indicate that some reactors used 50 tons of HF. Since the process is catalytic, very little make-up HF is needed to maintain the reactors at their capacity.

Anhydrous hydrofluoric acid is used in the preparation of inorganic fluorides, especially those compounds which are unstable in water solution; in the production of elemental fluorine; as the basis for a new electrochemical process[20] for the direct synthesis of organic fluorocarbons; as a stripping agent for enamel coatings in salvaging steel from defective enamelware, and as a suitable reaction medium for affecting nitrations with sodium or potassium nitrate. Organic sulfonation reactions also are performed in hydrogen fluoride with a measure of success. Cellulose dissolves very rapidly in it to form glucose, and a wood sugar process[14,17] developed in Germany depends upon this principle as a means of converting wood to sugar for fermentation to alcohol. Lignin can be recovered quantitatively from this process along with a certain amount of acetic acid.

The broadest field for the use of HF is in the organic chemical industry, where it plays a dual role: (1) It is used in the synthesis of organic fluorine compounds, and (2) it finds application in the synthesis of various types of nonfluorine-containing compounds. It can be used in such fields[21,26] as fluorination, hydrofluorination, polymerization, esterification, catalysis, alkylation, nitration, sulfonation, diazotization, molecular rearrangement, degradation, ring closures, etc., and as a reaction medium.

The aqueous acid finds use in the manufacture of many inorganic fluorides and acid fluorides; frosting, etching, and polishing of glass; as an antiseptic in breweries and distilleries; electroplating; cleaning of copper and brass; in the making of filter paper and carbon electrodes; and for the removal of silica from graphite: also in the removal of efflorescence from stone and brick, extraction of tantalum and columbium, pickling and galvanizing metals. Occasionally hydrofluoric acid is used in acidizing oil wells to increase oil production.

REFRIGERANTS

The phenomenal growth of the Freon refrigerants since their inception in 1930 to a proposed production capacity of 2,400 tons per month, as reported in 1944, represents one of the most outstanding developments in the synthetic organic chemical industry.

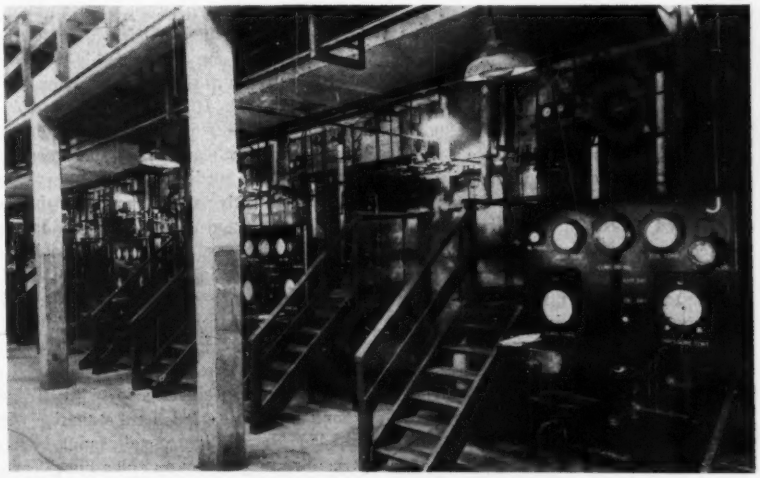
These new refrigerants have sparked the development of new types of fluorine-containing fumigators, plastics, dielectrics, dyes, solvents, lubricants, etc. In spite of their cost, these new products have found application where their unusual properties are unmatched by any other materials. Furthermore, these developments represent only "surface scratches" compared with what can be expected in the future.

In 1930 Midgley and Henne announced the commercial production of a new group of refrigerants, called the Freons. They are made by the Swarts reaction, which, expressed in its simplest terms, involves the replacement of chlorine in a suitable organic chloride with fluorine by means of a metallic fluoride or anhydrous hydrofluoric acid.

The synthesis of dichlorodifluoromethane (F-12) illustrates the mechanics of this reaction: Into a heated autoclave or reactor containing antimony trifluoride and a catalyst, both carbon tetrachloride

$$3CCl_4 + 2SbF_3 + \text{catalyst} \rightarrow 3CCl_2F_2 + 2SbCl_3$$

and anhydrous hydrofluoric acid are fed



Fluorination is carried out in autoclaves at Hooker Electrochemical Co. Shown here are banks of control panels from which the operator can observe and regulate the process.

continuously in a definite ratio. Antimony pentachloride is the catalyst most frequently used. The anhydrous hydrofluoric acid continuously regenerates the active fluorinating agent, antimony trifluoride.

The reaction products pass into a distillation column, where the free acids (HCl and HF) are separated from the Freon, and the insufficiently fluorinated raw material is returned to the reactor. For each chlorine atom that is replaced by a fluorine atom, there is a lowering of the boiling point by approximately 52°C., thus making the distillation operation very simple. The final product, after passing through scrubbing and drying towers is condensed and shipped in steel cylinders, drums and tank cars.

By substituting carbon tetrachloride with other polychlorinated methanes and ethanes, various other Freons can be produced. In general, their outstanding features are stability, noninflammability, nontoxicity, and noncorrosiveness. They find extensive use in refrigeration and air conditioning equipment, where the application and the type of compressor determines to a great extent the choice of refrigerant.

General Chemical Co.[1] in 1946 announced the availability of two fluorinated ethanes, CH_3CHF_2 and CH_3CClF_2, and called them Genetron 100 and 101, respectively.

In the chemical industry, some of these compounds are used as intermediates in the manufacture of other fluorinated products. Certain fluorinated derivatives of propane and butane have been discussed in research circles as having practical application.

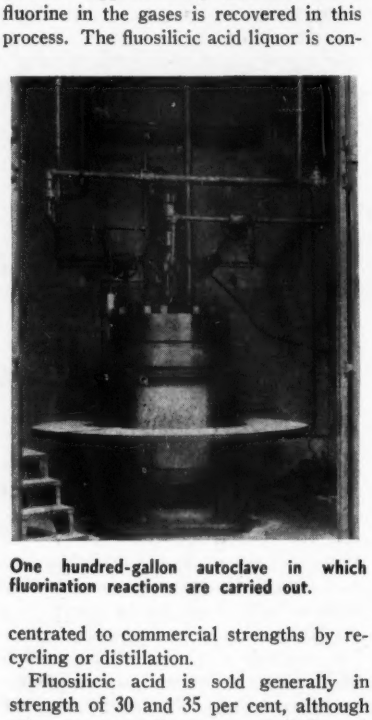
An interesting application for F-11 and F-12 came as a result of the development of the aerosol fumigator or "bug bomb." The extermination of mosquitoes, flies, and other disease-carrying insects in enclosed places became a matter of minutes with these fumigators.

FLUOSILICATES

The position of fluosilicic acid and its salts is unique as far as a fluorine chemical industry is concerned. The fertilizer phosphate industry, confronted with the necessity to dispose of by-product fluorine-containing gases in an innocuous form, developed a silicofluoride chemical industry. In other words, fluorine has always been considered a necessary evil by the phosphate interests. The magnitude of this by-product fluorine has been pointed out already, and its potential implications for the future cannot be ignored.

Even though the phosphate industry is considered almost the exclusive producer of silicofluorides, the anhydrous hydrofluoric acid manufacturers also produce a small amount of this material as a secondary product. It should also be pointed out that it is possible to develop a silicofluoride industry based on low-grade fluorspar (high in silica) if economic conditions ever warrant it.

In the acidulation process for the manufacture of fertilizer phosphate, the rock phosphate is treated with sulfuric acid and approximately one-half of the fluorine is evolved in the form of a gaseous mixture. This toxic gaseous mixture of hydrofluoric acid, silicon tetrafluoride, and fluosilicic acid is passed through water absorption towers. Fluosilicic acid (H_2SiF_6) and a precipitate of silica are formed. Approximately one-half of the fluorine in the gases is recovered in this process. The fluosilicic acid liquor is concentrated to commercial strengths by recycling or distillation.



One hundred-gallon autoclave in which fluorination reactions are carried out.

Fluosilicic acid is sold generally in strength of 30 and 35 per cent, although other concentrations are available. A large use for this acid is in the brewing industry as a disinfectant for copper and brass vessels. It is sold also for use as a preservative, in electroplating, as a concrete hardener, and in the manufacture of silicofluoride salts.

Sodium silicofluoride (Na_2SiF_6) is the most common salt, and is readily prepared by the addition of sodium chloride or soda ash to the acid. It precipitates from solution as a white, finely-divided solid. In many recovery plants this salt is considered the sole medium of disposal. It is used extensively as an insecticide, laundry sour, fluxing and opacifying agent in the ceramic industry, and as a protective agent in the casting of light metals. With a production of over 10,000 tons in 1944, its value for that year can be estimated to be about $1 million.

Ammonium fluosilicate is prepared by neutralizing fluosilicic acid with strong ammonia. This salt is used extensively in the laundry and light metal casting industry. The magnesium and zinc fluosilicates also are prepared from the acid by neutralization. Both salts are used as concrete or wall hardeners, and the magnesium salt finds application also in magnesium foundries. The zinc and copper salts are useful as impregnating compounds for the prevention of wood decay.

Barium silicofluoride is a common insecticide and is used in ceramics. Lead fluosilicate is used primarily in the electrolytic refining and plating of lead. Occasionally salts such as calcium, iron, aluminum, cobalt nickel, and potassium are mentioned as having special limited uses. It is interesting to note that zinc, magnesium, copper, and lead fluosilicates are all quite soluble in contrast to the sodium and potassium salts.

SYNTHETIC CRYOLITE

The aluminum industry is one of the heaviest consumers of fluorine compounds. Cryolite comprises the molten bath in the electrolytic cells; and aluminum fluoride and fluorspar are added directly in small amounts from time to time while the cells are operating.

The aluminum industry is not dependent upon natural cryolite and is consuming large quantities of the synthetic material derived from fluorspar; but unofficial statements indicate that the natural cryolite is usually favored when the cells are put into operation. In general, synthetic cryolite is prepared by reacting a mixture of alumina and hydrofluoric acid, and neutralizing with soda ash or alkali. A more recent process was mentioned previously.

Both synthetic cryolite and aluminum fluoride are used in the ceramic industry. The insecticide industry offers a ready market for cryolite, especially in the form of fruit orchard sprays.

MINOR FLUORINE COMPOUNDS

The fluorine chemicals discussed in this section have been arbitrarily grouped together for the sake of brevity. Some compounds may be produced in tonnage lots at a fairly low unit cost, whereas others may have a limited market and demand a high price. The real purpose of this discussion is to point out the wide range of uses along with the wartime and more recent developments of the fluorine industry.

INORGANIC FLUORIDES

For the purposes of preparation, simple inorganic fluorides may be classified into two groups depending upon their stability in water. Those stable in water solution can be prepared by reaction of their carbonates, oxides or hydroxides with aqueous hydrofluoric acid. This group comprises practically all of the well-known fluorides. Some of them form acid fluorides with an excess of acid. The double fluorides are obtained by reacting two basic components in the proper proportions in hydrofluoric acid.

The second group, fluorides which hydrolyze in water, are prepared usually from the chlorides with anhydrous acid. Examples of this group are boron trifluoride (BF_3), and antimony pentafluoride (SbF_5).

Still another group of fluorides such as cobalt trifluoride (CoF_3), chlorine trifluoride (ClF_3), sulfur hexafluoride (SF_6), and uranium hexafluoride (UF_6), should be mentioned as they require gaseous fluorine in their synthesis.

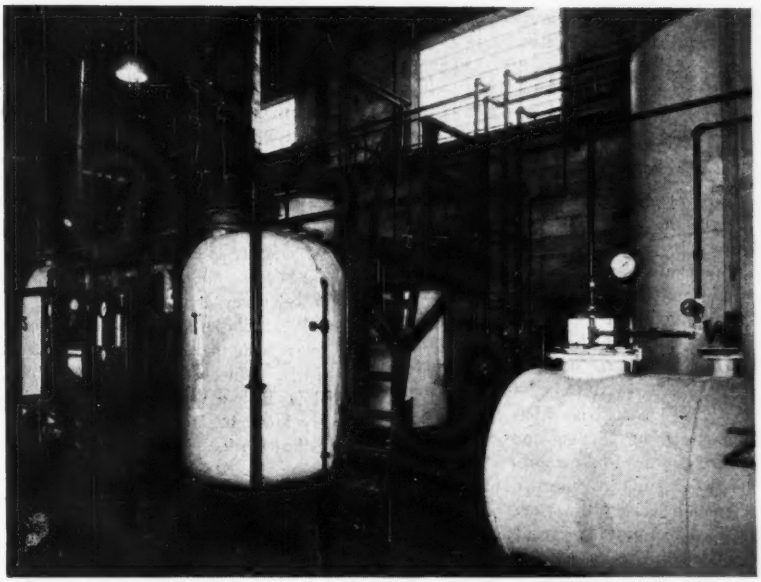
The uses of inorganic fluorides extend over a broad range, but there are relatively few that are used in tonnage lots. Most common salts are the sodium, ammonium, potassium, barium, zinc, magnesium, chromium, aluminum and antimony salts. The sodium, potassium, and ammonium salts find use in preservatives and insecticides. (A common roach powder uses sodium fluoride.) The ceramic industry utilizes salts of lithium, sodium, copper, beryllium, barium, strontium, zinc and aluminum. Beryllium fluoride and its sodium double salt are used in the production of metallic beryllium. Sodium fluoride finds a market in the steel industry for promoting soundness in the outer layer of a steel ingot and in rim steel production. Zinc fluoride is employed in insecticides and for wood preserving. The chromium salt finds application in the textile printing and dyeing industries.

Antimony, mercury, zinc, and potassium fluorides are used in the synthesis of organic fluorine compounds. Boron trifluoride is employed as a catalyst in the manufacture of some synthetic rubbers, and fine organic chemicals. Rare earth fluorides are used in the cores of carbon electrodes for anti-aircraft searchlights. Synthetic fluoride crystals of lithium and calcium are found in optical instruments. Cobalt trifluoride finds extensive use in the synthesis of fluorocarbons.

Chlorine trifluoride was contemplated as an agent for incendiary bombs, and can be used in certain types of fluorinations. Due to its high dielectric value, sulfur hexafluoride is used as a gaseous insulator in x-ray equipment and the like where extremely high voltages are involved.

Uranium hexafluoride, UF_6, merits special attention because of its basic use in atomic energy. The amount of uranium hexafluoride which has been produced or will be in the future is relegated appropriately to the secret archives of the Atomic Energy Commission.

In commerce, the acid fluorides are usually represented by the sodium, potassium, and ammonium salts. They are used as laundry sours, for etching glass, in welding fluxes, and in fusion mixtures for the extraction of various metals. The potassium salt is used exclusively in the commercial preparation of fluorine. Fluoboric acid, HBF_4, is used in electroplating, aluminum reflectors, and in making dyes and organic fluorine chemicals.



Rectification equipment for purifying a fluorinated compound, bis(trifluoromethyl)benzene.

Among the double salts, synthetic cryolite, Na_3AlF_6, is the most important. Sodium antimony fluoride is used as a mordant in dyes, and in the synthesis of organic fluorides. The sodium, potassium, and ammonium fluoborates find application as sand agents in the casting of aluminum and magnesium, in electro-chemical processes, and chemical research.

FLUORINE

The uses of elemental fluorine are very limited at the present time. Presumably, large quantities were and are being used in the preparation of uranium hexafluoride. Sulfur hexafluoride is prepared by the direct combination of sulfur and fluorine. Higher metallic fluorides (CoF_3, AgF_2, CeF_4, MnF_3, etc.) and halogen fluorides (ClF_3 and BrF_3) useful in certain organic fluorinations can be prepared only by the use of fluorine gas because of its high oxidation potential. One of the methods developed during the war for the production of fluorocarbons involves the direct fluorination of organic compounds.

The synthetic organic chemical industry, with its diversity of compounds and extensive applications, offers unlimited opportunities for the development of organic fluorine compounds in many fields of interest.

The I. G. Company of Germany introduced a group of fluorine-containing dyes[18] to the American market in the 1930s. These brilliant dyes of yellow, orange and red colors exhibited unusual color clearness, and possessed excellent light and laundry fastness. Fast Orange Salt RD and Fast Orange Golden Salt GR are two examples of this group, and they are supposedly benzotrifluoride derivatives. Benzotrifluoride ($C_6H_5CF_3$) is a very stable organic fluorine compound and the American production of this compound has been announced recently. Once these dyes appeared on the market, imports increased each year until the war.

Concurrently with these dyes, the above company also introduced certain stabilized diazo salts containing the fluoborate radical. In other words, they were diazonium salts of fluoboric acid (HBF_4). Fast Red Salt RL, 2-methyl-4-nitrobenzene diazonium fluoborate, is a typical example. Besides fluoboric acid, certain metallic fluorides, fluorosulfonic acid, and borofluoro sulfonic acid can be used as diazo stabilizers.

FLUOROCARBONS

The "atom" bomb was responsible not only for the large-scale production of gaseous fluorine and uranium hexafluoride, but also for the development of a group of completely fluorinated organic compounds. In order to separate the isotopes of uranium by a gaseous diffusion process, it became necessary to develop a liquid[2] which possessed unusual thermal and chemical stability. The completely fluorinated hydrocarbons provided the answer and are known under various coined terms such as "perfluoro" hydrocarbons, "fluorocarbons," and "fluocarbons."

The synthesis of these compounds depended upon the development of controlled methods of fluorination of hydrocarbons without the usual explosions or extensive scission of carbon-carbon linkages. Decomposition is due to the fact that fluorine is the most reactive element known, and its heat of reaction is so high that very few organic systems can absorb the heat impact directly without disintegrating. Two general methods were developed: (1) fluorination with gaseous fluorine; (2) fluorination with CoF_3, etc.

It is interesting to compare the heats of reaction in the two methods.

(1) $C_7H_{16} + 16F_2 \longrightarrow$
$C_7F_{16} + 16HF +$
1660 kg.-cal.

(2) $C_7H_{16} + 32CoF_3 \longrightarrow$
$C_7F_{16} + 32CoF_2 + 16HF +$ 1000kg.cal.

The second method has the lower heat of reaction, for part of the energy has been dissipated previously in a separate system in converting CoF_2 to CoF_3. Complete details of both methods of fluorination and the various fluorinating agents which can be used have been described[2].

A new and novel process for the preparation of fluorocarbons has recently been announced by Simons and co-workers[20] which appears to accomplish the same objectives as direct fluorination. It is an electrochemical process involving electrolysis of a mixture of organic substances in liquid hydrogen fluoride.

One of the uses for the liquid fluorocarbons has been mentioned already in connection with atomic energy. Unusual stability and noninflammability suggest their use as lubricants, coolants, and hydraulic liquids.

Today there are two fluorine-containing plastics on the market. Teflon, derived from tetrafluoroethylene, is produced by the Du Pont Co. The other, Kel-F, derived from trifluorochloroethylene, is marketed by the M. W. Kellogg Co.

PEST CONTROL

During the recent war, considerable use was made in Germany of a fluorine compound related to DDT. It is called DFDT and chemically it is known as 2,2-bis(*p*-fluorophenyl) - 1,1,1-trichloroethane. Instead of using chlorobenzene as in the synthesis of DDT, fluorobenzene is used. Production of DFDT must have reached sizable proportions, for fluorobenzene was produced at the rate of 12 tons per month for the manufacture of this insecticide.[11] It appears that for certain insects it is more effective than DDT. The production cost of this insecticide is considerably higher because of the higher cost of fluorobenzene over that of chlorobenzene. It remains to be seen if this insecticide will find a place on the American pest-control market.

During the war years the sodium salt of monofluoroacetic acid (FCH_2CO_2Na), also called "1080," was discovered to be the most toxic rodenticide known.

The commercial process for its manufacture has been described by Jenkins and Koehler.[16] About 10,000 pounds a year meet the present commercial demand. During the war it was used extensively for rodent control around military installations.

That "there is nothing new under the sun" aptly applies to "1080." Nature has endowed a plant in South Africa with the ability to synthesize this toxic principle, although its identification in the plant was not accomplished until 1944 by Marais.[19] This is the first recorded synthesis of an organic fluorine compound in Nature. To add a bit of irony to the great war secret, the natives in the natural habitat of the plant have been aware of its poisonous properties to cattle and rodents for many years.

Pardinon (3-fluorotyrosine) and Epidermin (4,4'-difluorobiphenyl) appeared on the German drug market before the war.[18] The sodium salt of *p*-fluorobenzoic acid has been mentioned as an internal antiseptic. Diisopropyl fluorophosphate, called DFP, is a very toxic material, but in very low concentrations it can be used in medical work.

OUTLOOK

After reviewing the position of fluorine and its compounds in industry, it is obvious that fluorine chemicals are finding their industrial niches by the impact of their unique properties. By the same token, industry has found a new tool in fluorine chemistry that has fabricated and will fabricate for tomorrow new products of outstanding quality.

In view of these facts, it is very much to the point to discuss briefly some fundamental concepts of fluorine chemistry. Fluorine is the most reactive and electronegative element known. The element and its compounds exhibit not only some of the usual halogen family characteristics, but also many unique properties quite foreign to the other members. These concepts lead to a research philosophy that anything can happen in fluorine chemistry.

The achievements of the last decade are but a feeble introduction to the many frontiers still waiting to be challenged and probed. In short, fluorine promises to write one of the most brilliant chapters in academic and industrial chemistry.

A synthetic fluorine chemical industry is based essentially on fluorspar and hydrofluoric acid, and an industrial fluorine economy will continue to revolve around these basic materials for many years to come.

Much has been said about the availability of fluorspar, the primary raw material. It is true that it is a strategic mineral, but by shifting the demand for metallurgical spar, under emergency conditions, to Mexico and other sources, the domestic industry should be able to produce adequate tonnage of acid spar for many years. This probability is further enhanced by the fact that the Illinois-Kentucky fluorspar district has the facilities, the know-how, and the capability of producing increased tonnages of high-grade acid spar of constant and uniform quality.

Very little needs to be said about hydrofluoric acid, the key chemical, except in retrospect. It is available in all strengths, on a large tonnage basis, and at a fairly reasonable price. It is interesting to note that the demand for the acid has been increasing steadily since the postwar recession. This means that the chemical industry is expanding its fluorine chemical interests in a peacetime economy.

RIPE FOR RESEARCH

Research and development in fluorine chemicals is no longer relegated to the isolated work of a few intrepid academic investigators. Modern technology has solved many of the difficult problems of handling, control, and operation. In fact, many process industries are capable of embarking upon a fluorine program because of the caliber of their research staffs, experience in handling other operations just as hazardous, and the availability of modern equipment. Immediate success is not to be expected, but a long-range program based upon an experienced and capable staff, and synchronized with materials already within the organization, is bound to achieve commercial objectives.

The opportunities for research with fluorine chemicals are virtually unlimited. Since fluorine in its compounds exhibits very unusual properties, advantage must be taken of the unusual. Fluorine compounds will be expensive and they must find their place on the industrial market where their superiority will not have any close competitors. In general, fluorine exhibits unusual stability in its compounds in contrast to chlorine or other halogen atoms. Many changes in the properties of compounds, such as volatility, surface tension, index of refraction, etc., are induced by it. Such fields as solvents, plastics, medicine, pharmaceuticals, dyes, insecticides and many others offer unusual opportunities.

Fluorine compounds run the extreme in toxicity; some are as inert as nitrogen, whereas others such as "1080" are very poisonous. Very few studies have been made on toxicity and the effect of fluorine in biological systems.

In retrospect, fluorine chemistry is one of the newest fields of chemical endeavor and promises to increase in stature in the future.

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(*Turn to page 149*)

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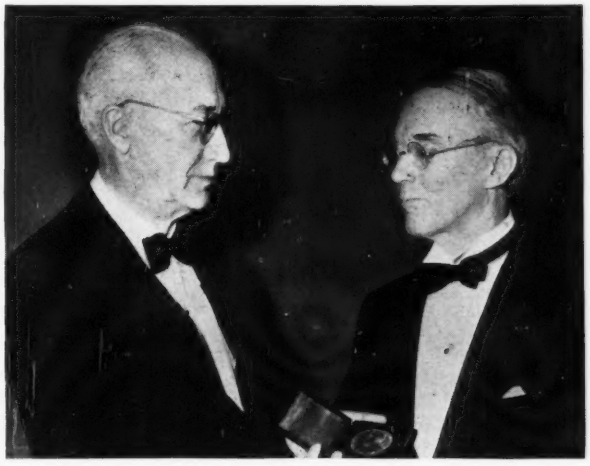
A. E. Sidwell, Jr., comes from the AMA to be assistant director of research, Columbia Chemicals Div. of Pittsburgh Plate Glass Co.

E. H. Volwiler, Abbott Laboratories vice-president, was voted president-elect (1950 term) of the American Chemical Society.

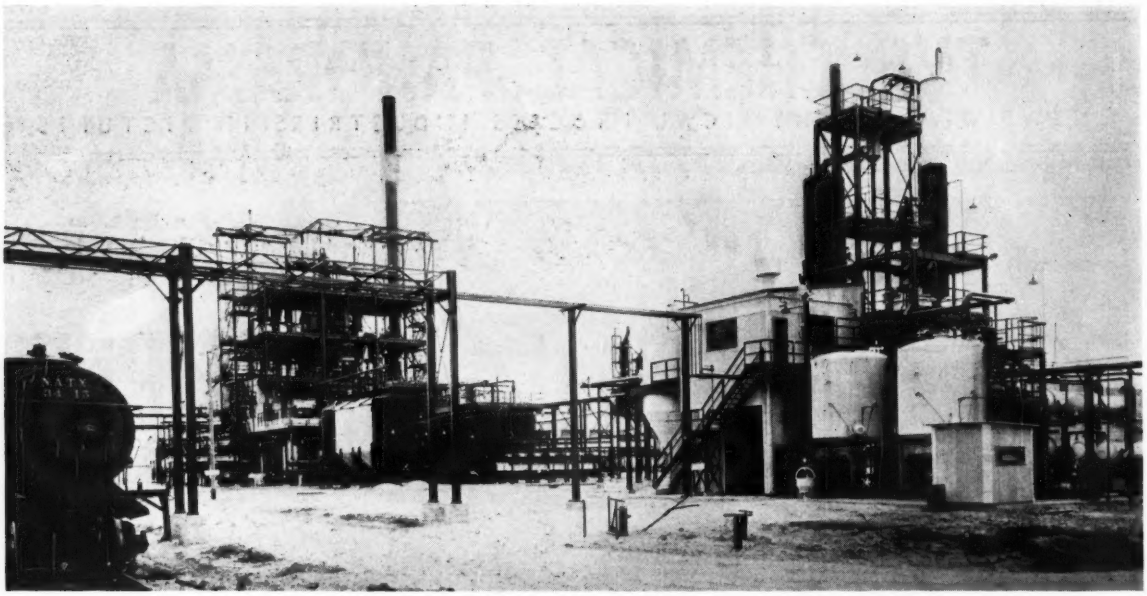
John A. Sargent moves up from vice-president of finance to executive vice-president of Diamond Alkali Company.

J. H. Bruun is now director of General Aniline & Film Co.'s Central Research Laboratory at Easton, Pa. He will also direct the work of divisional labs.

O. E. May has been elected vice-president in charge of quality control of the Coca-Cola Co. He joined the firm in 1946.



Frederick G. Keyes (right), head of the chemistry department at M.I.T., receives the A.S.M.E. medal from E. G. Bailey, Institute president.



Hydrogen cyanide and acetone cyanohydrin unit is on the left, ethylene cyanohydrin unit on the right. Hydrosorber is directly in center.

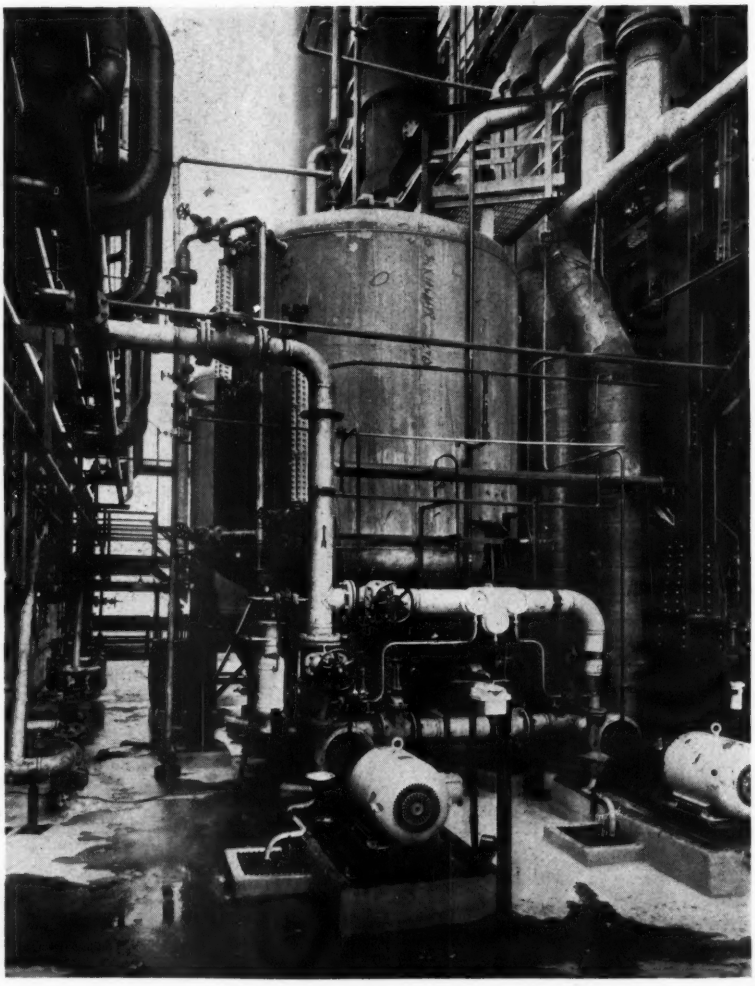
Rohm & Haas Builds At Houston

Joining the trek to the most convenient well-spring of carbonaceous raw materials—Southwestern U. S., the Rohm & Haas Co., Philadelphia, has completed a new plant at Houston, Texas. A pioneer in the manufacture of acrylic plastics, the company is extending its control over acrylic raw materials, will produce acetone cyanohydrin (methacrylate intermediate) and ethylene cyanohydrin (acrylate intermediate) for processing to finished materials elsewhere in its facilities (*see CI Newsletter, October 1948*).

Hydrogen cyanide, one of the basic raw materials, is produced at Houston from natural gas (methane) and ammonia. This is combined with acetone or with ethylene oxide to yield the aforementioned intermediates.

The plant is actually on the south side of the Houston Ship Channel, about halfway between the city and the exit to Galveston Bay, and adjacent to the Diamond Alkali Co. plant.

Construction of the new plant is one of the recent series of developments within the company (*see pp. 33, 34*). Rohm & Haas has absorbed, as divisions, its former associated companies, Chas. Lennig & Co. and Resinous Products & Chemical Co., and has intensified its activities in the petrochemical field.



The first step in process is formation of HCN from methane and ammonia. This view, at 21 feet up, shows piping and equipment near the converter cells in the HCN-producing section.

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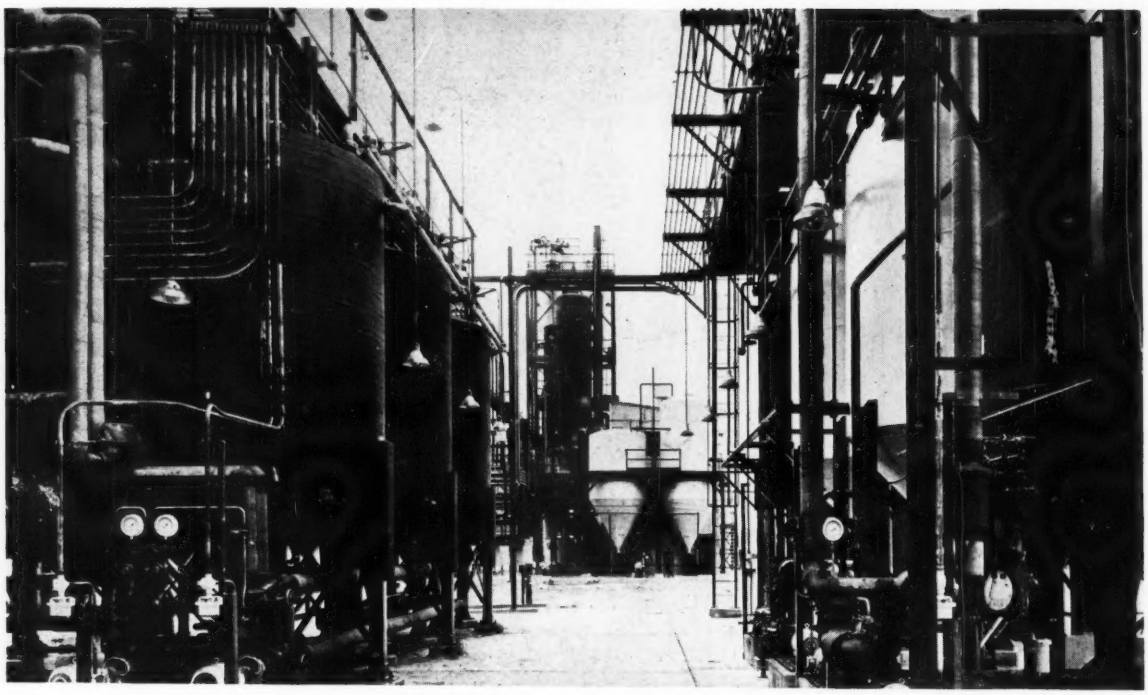
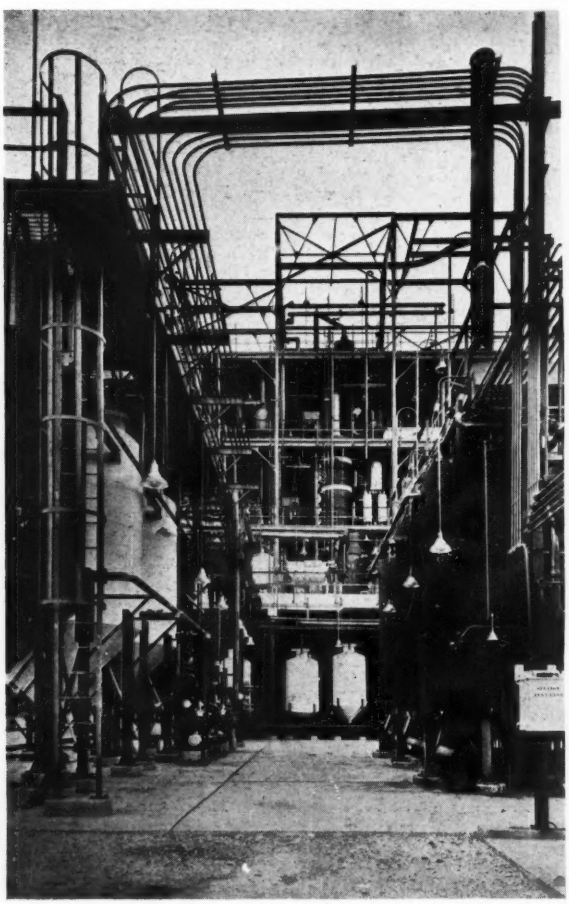
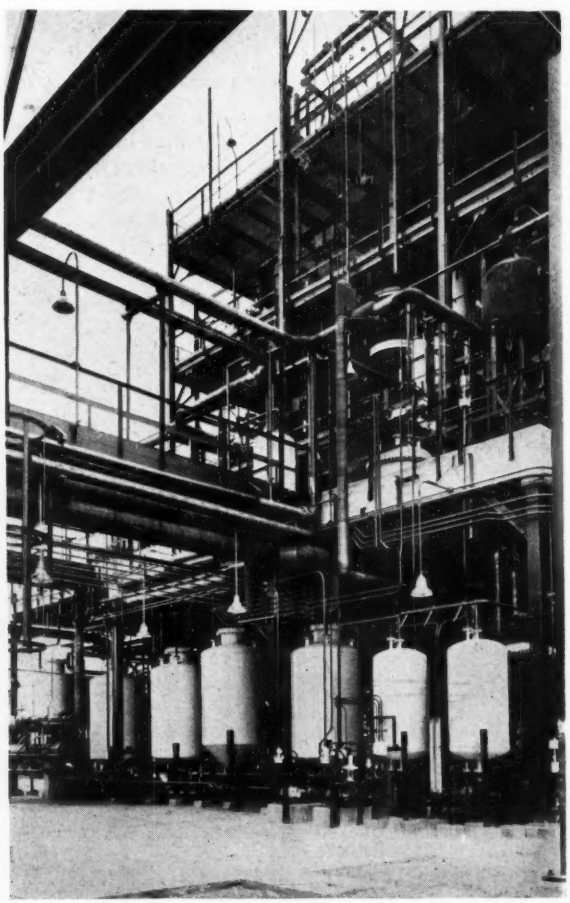
ROHM AND HAAS BUILDS AT HOUSTON (Continued)



Reaction of HCN with acetone or ethylene oxide gives the desired intermediates. Above: View through working tanks toward ethylene cyanohydrin unit. Below: Looking toward acetone cyanohydrin unit in left-hand picture; closer view, showing process equipment, at right.





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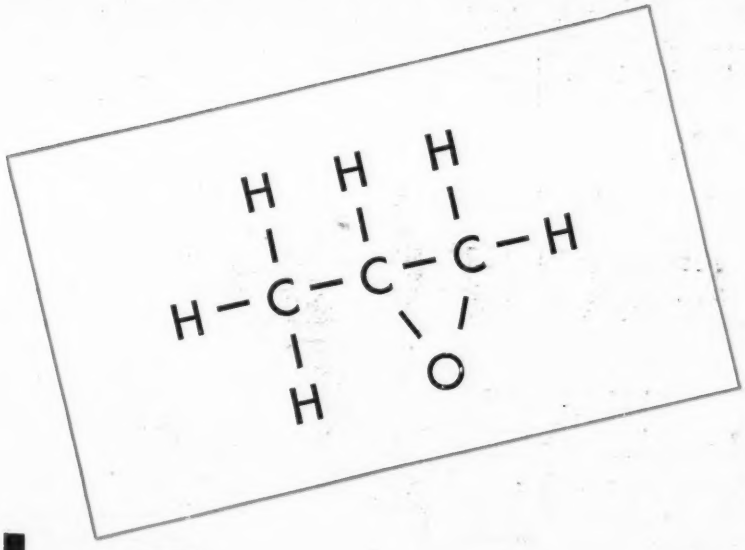

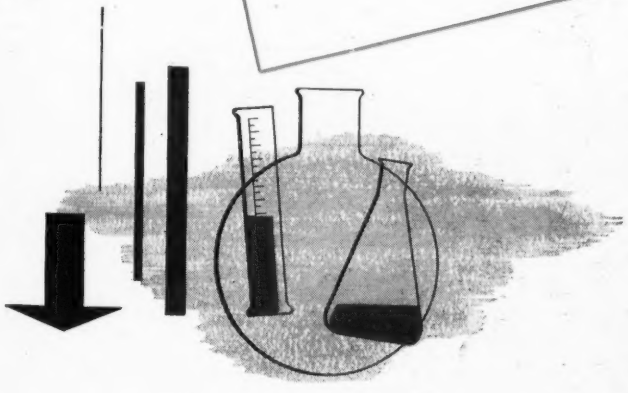

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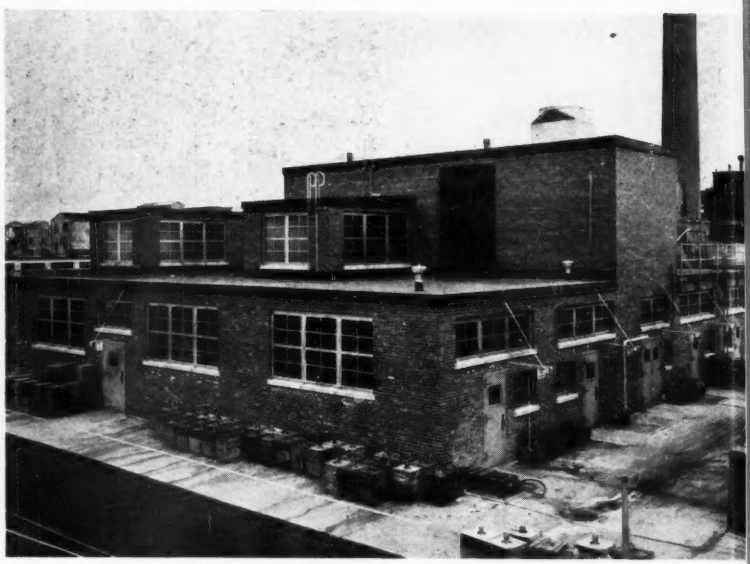

A new laboratory building—which is in reality a "plant" for the production of synthetic organic chemicals—has been put into use at Eastman Kodak Company's Kodak Park (Rochester, N. Y.) plant. The new unit is the first of three planned: a second, now under construction, will be completed this year, and a third will be erected later. The new building, of 6,000 sq. ft. area, cost over $300,000.

Hanford Grows

National Clay Pipe Manufacturers, Inc.

The largest single peacetime construction job in U. S. history is under way at Hanford, where a new plutonium plant is going up at a cost of 300 to 500 million dollars to augment the atomic energy project built there during the war. Hanford Engineer Works, covering 600 square miles, is now being operated by General Electric Co. for the Atomic Energy Commission.

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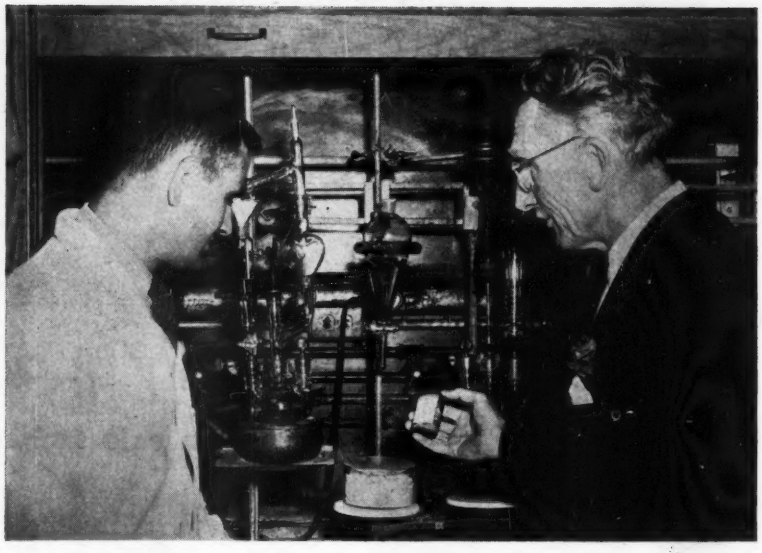
SOME 10,000 NEW COLLEGE GRADUATES will enter chemical industry this year. Here are pointers on how recruiters can spot those with the best chances of success.



What Makes a Good College Trainee For Chemical Companies?

by ROBERT N. McMURRY, Ph.D.
Robert N. McMurry & Co., Chicago, Ill.

CHEMICAL companies are constantly confronted with the problem of securing capable people who can be trained for responsible jobs in technical, laboratory, financial, office and administrative departments. An obvious source of candidates is the various colleges and universities where students have exhibited some degree of scientific specialization and thereby displayed some preference for one field over another.

The recruiting of college seniors is usually characterized by a great deal of emphasis upon academic achievement, high intelligence and good personal appearance. However, it is questionable whether academic achievement, I. Q. score, personal appearance and a variety of standard tests, give a sound basis for the employment of college trainees. For the past 13 years we have interviewed thousands of prospective employes for client companies. College trainees, however, were usually secured through special company interviewers. The high rate of turnover among college trainees has led us to make a special study of this group of employe.

The study, upon which the following analysis is based, involves 1,167 college trainees chosen by 247 companies over a period of 13 years. Of that group of trainees, *only 58 per cent were adjudged able and suitable after a year or more of training.* The median value of the expense of training each one of these young men was placed at $2,750 during the first year. That does not include the intangible costs such as supervision, spoilage, lower department morale, etc. When, as reported by one chemical company, only 16 of the 31 trainees were with them at the end of the first year, the actual loss was $41,250. Not only did they incur the loss, but the task of filling the ranks had to be started over again with one year wasted.

Of the 1,167 trainees involved in this study, 42 per cent (or 490 trainees) proved unsatisfactory or had left before the end of the year. The total cost to their companies was $1,347,500. Multiplied many times for the many trainees who fail, the cost to industry is large.

What factors are responsible for the failure of many college trainees and why is it that recruiters do not spot these factors in advance?

Our study of the behavior of college trainees on the job indicates that, *other than technical competence,* seven major characteristics mark the man who is most likely to fit into an organization successfully:

1. Occupationally stable. It is important that men be hired who will stay in the program long enough to bring a return to the company for the money invested, and more than that, advance to more responsible positions. Some bright young men have never acquired the habit of staying at one activity or in one place for an extended period of time. They are always "looking around." When asked the question: "Are you interested in joining our company as an executive trainee in sales, product development, engineering, finance, etc.?", the obvious answer is "Yes," especially if the company has a distinguished name. But unfortunately, this will not guarantee that the trainee will remain with the company for any extended period.

Some college men have strong but transient enthusiasms for different fields. One good student tried engineering for one year, business law another year, a third year mathematics, and finally wound up a major in chemistry. Here, because of good appearance, he was chosen by a recruiter to work in the sales division of an industrial chemical manufacturer.

However, his basic instability soon made itself felt in passing enthusiasms for different aspects of his job. Tasks, energetically begun, fell by the wayside,

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BRANCHES IN PRINCIPAL CITIES

COLLEGE TRAINEES FOR CHEMICAL COMPANIES (Continued from page 66)

unfinished or barely finished to the office manager's satisfaction. The trainee would overlook important instructions, or forget to relay vital information to the manager. His interests ran off into all directions because he was basically unsettled, always seeking to try something else, and always only momentarily enthused.

In another case, a bright student chosen as a trainee in the laboratory, turned out to be equally unstable — but his instability was related to an unconscious feeling of inadequacy. During the first few months of his employment, he would bring his completed assignments, no matter how minor, to the attention of his superior. He elaborated upon the regular duties of his job in order to gain attention and approval. He would tell his associates about his "difficult assignments" and how well he performed them.

After several months of this, his coworkers began to avoid him and his superior found it increasingly difficult to spend time in listening to the trainee's "apple polishing" which was really the trainee's way of seeking face-to-face approval and reassurance.

At the end of seven months, the young man quit after telling his associates how unfairly he had been treated, how company promises were not kept and how the others could expect little advancement under the present management. Yet such inherent tendencies in this man could well have been spotted in advance.

2. Uncomfortable when idle. Every man, when asked directly if he is industrious, energetic, desirous of achievement, will promptly reply in the affirmative. No other answer is possible. Yet the truth is, as everyday evidence indicates, that not all men have an industrious character; not every young man will labor steadily, voluntarily, conscientiously and productively on his assigned tasks and duties.

The intelligent student who finds school work easy, who has never had to earn any of his own spending money, who has had his way through school paid by others, who has idled his summers away at resorts or in purely pleasurable activities, has never developed the habit of working hard. That sort of person, in private industry, never voluntarily chooses hard or stubborn tasks, never willingly takes on responsibilities unless specifically designated for him, and in general is a "clock watcher." Late work is anathema with such people, no matter what the emergency.

Another non-industrious type is the young man who is so anxious to achieve status, prestige and money — usually found at or near the top of the ladder — that he is impatient with the intermediate steps and therefore never performs his duties with diligence and interest or any passable degree of industriousness. He is also outraged when others are promoted ahead of him.

The industrious character, however, is uncomfortable — and may make others ill at ease — if required to remain idle, and is usually motivated by a desire to achieve. That achievement, in such young men, expresses itself in diligent labors, a drive to finish constructive tasks, and no particular yen to find an easy way to earn a living. That sort of man is realistic in accepting the bad with the good, the late work with the paid holidays; and the rare Sundays which require his presence on the job give rise to little more than good-natured grousing.

3. The ability to follow a path to the end. The ability to persist in an activity despite difficulties and obstacles, and to finish what they have started is characteristic of good men.

Young men starting out expect to be instructed and given some help over the rough spots. Some need more support than others. However, it should not be necessary to give this support indefinitely, or even for a prolonged period in order to make sure that projects are completed.

Too often, a young man will only half-heartedly follow out a matter until its final conclusion. Such a character is reluctant to take on anything which appears to go outside his exact instructions or which has to be pursued through difficulties.

Young men of this sort are usually the products of homes in which love and protection enshrouded them like a strait jacket. Most of these boys were rarely if ever reprimanded for failure to do their best, or even scolded for not coming up to standard. If their spelling was worse than that of their classmates, the excuse was that the teacher favored other children. If they took music lessons, they were rarely required to knuckle down and practice regularly or do as well as they could. Where the child did exhibit any perseverance along any lines, it was only permitted to develop if it lay along the avenue dictated by the parents.

4. His goals are not egocentric. Almost every business demands that its employes put the company's interests before their own, and if necessary, requires that the employes, on occasion, go beyond the ordinary requirements of their jobs and put in a few extra licks for the company.

A man with ability to project his ambitions and unite them with company welfare and company goals, is more apt to be successful at his tasks within an organization than where the reverse is true. But that requires a particular type of personality.

Young men who have had sheltered lives either as only children, youngest children or sickly children, etc., who have been protected by over-zealous parents, very often become demanding adults and continue to expect others to do for them. They have no drive towards doing for or contributing to others. Company or team loyalty is a wider concept than these individuals are capable of grasping; their usual images are ego-centered, and they approach all problems from the point of view of looking out for themselves first of all.

This type often has little regard either for company property or company funds, sneers at employes who persist on staying overtime in order to finish some assigned task, and often takes shortcuts on company policy and company procedure.

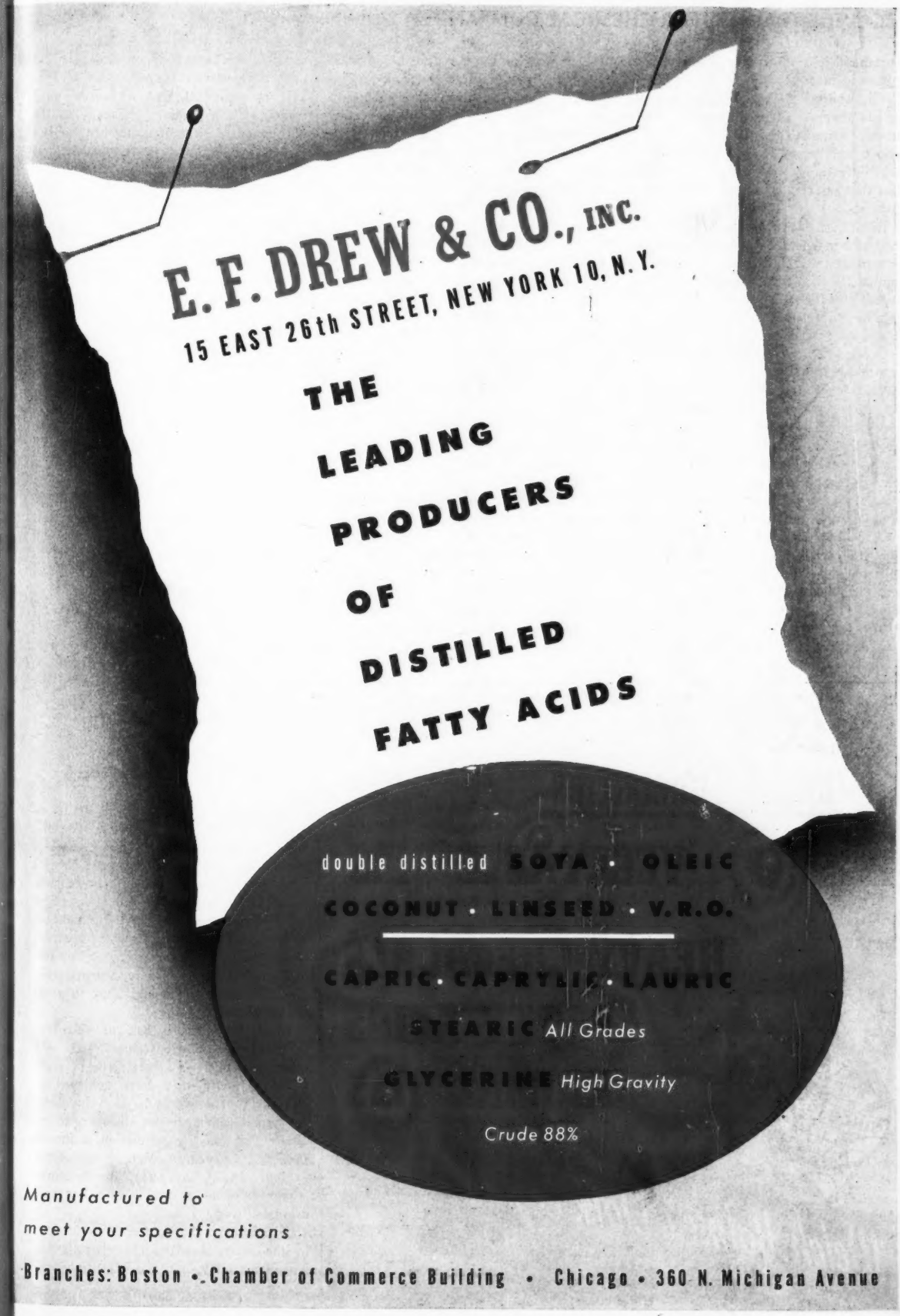
5. Able to fend for himself. In every job there is a degree of self-reliance involved. As jobs go up in status and power, they affect more people. Top executives' decisions affect most of the people in a business.

The ability to make decisions is part of self-reliance. Junior men in departments are always called upon to make minor decisions. They must also, if they are going to succeed, acquire the habit and ease of making more decisions involving matters of increasingly greater complexity and affecting more people.

However, some men never learn to make decisions because they are basically afraid of responsibility. They will avoid decisions whenever possible, ask associates for opinions on what to do, confer with the department head's secretary on what she thinks they ought to do, throw responsibility on other people for decision-making, and in general, avoid making judgments on anything but the most obvious and immediate matters.

This variety of trainee may speak well, have good manners and be particularly adept on rationalizing his arguments on why the decision falls into somebody else's bailiwick. Because of his verbal facility, he is usually believed. But the fact remains that he is usually never caught making a wrong decision because he avoids all decisions. Yet by his mode of operation, he antagonizes his associates and creates a resentment against his actions.

6. Has social elasticity. The ability of any man to make and hold friends, to maintain good working relationships with others and to obtain good personal acceptance by others, is extremely im-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portant in jobs which require direct face-to-face contacts.

The ability "to get along with other people" is only in part an ability to be friendly with others. In good part, it is also the ability to accept criticism, to accept differences of opinion, to accept the fact that associates may be rivals without rivalry.

In all business, no matter at what level, men gather together to discuss some common departmental problem and reach a mutually satisfactory solution. True, the department head has the last word to say, but suggestions are freely given, accepted or turned down.

Occasionally, a college trainee will turn out to be a sharply competitive, uncomfortably critical person, who regards all his associates as rivals, and who unnecessarily criticizes their conduct and work. Such an individual is fiercely bitter in departmental conferences if his judgments and suggestions are not wholly and completely accepted. Rejection of any part of his suggestions is regarded by him as an indictment of his honor and integrity. He will even go so far as to urge the department head to fire or transfer some other individual who, by chance, has consistently rejected his ideas in whole or in part.

While such individuals may have excellent intelligence and good judgment involving materials, their conduct invariably is keyed to forcing others to cooperate with them rather than meeting colleagues half-way. Where their (unconscious) aggressive tactics arouse reactions, they endeavor to label all others as uncooperative. Should their opinions be by-passed, they will sulk and pout and criticize the work of associates.

Individuals who do not have the habit of working consistently with other people, of living through the ordinary give-and-take of business life, of making room for other people's opinions and judgments, do not, as a rule, work out satisfactorily as trainees. They may be successful as department heads, but only if all their employes are "yes men," and confine their decisions to chiming harmoniously with the expressed opinions of the chief. But as a worker in the vineyard, such trainees invariably cause trouble.

7. Can exercise authority without being belligerent. Trainees who come in at the bottom of the ladder are not expected to start out in positions of leadership. They are expected to follow orders and keep their eyes and ears open. Nonetheless, a trainee who does not possess certain basic traits will not develop into a leader, nor will he inspire confidence into a staff or a department even after years of experience.

It is important that a trainee must want to be a leader. Quite often, the unconscious desires of some men are not to lead people, but to accept instructions and follow directions. Some men are frightened by responsibilities and (unconsciously) avoid administrative burdens.

On the other hand, there are men who enjoy being supervisors, not primarily because of the power which it permits them to exercise, but because of the wider achievement it permits them to gain. Such men usually regard subordinates as human beings, with consideration of their feelings, their status, desires, etc., and gain effectiveness by *inspiring* confidence, admiration and trust.

At the same time, however, there is the department head or chief assistant who regards his subordinates as hired "hands." Since his orientation and desires are upward, he sees no reason for being polite, considerate or even personable with those beneath him. He is apt to be arrogant and harsh, arbitrary in his demands, and capricious in his instructions. His qualities as a leader — even with the small handful over whom he holds authority — is nil, and the turnover in his area is therefore high.

Trainees who are apt to develop into such characters are usually indifferent to those around them. Some want to get ahead so fast that they will climb all over everyone in the organization in so doing. They will invariably arouse antagonisms in others on their level, and resentment in people beneath them.

In looking at these seven character traits, it may be interesting to notice that they are really part of a deeper and wider personality structure. In essence, anyone who is stable, industrious, persevering, loyal to others, self-reliant, compatible with fellow-workers, and willing and able to lead people, is basically a *mature* person. Absence of these traits, or any one of them, indicates *emotional immaturity*— i. e., the failure of an individual to grow up emotionally.

What, therefore, is basically involved in evaluating college trainees — as with other personnel — is the degree of emotional maturity they have achieved in relation to the particular job involved. Immature people are not strangers to us. Well over half the population is immature *in some area or other.* Some of the exhibitionists (show-offs), for example, have capitalized on it, and we enjoy their dramatic work.

On the other hand, a cost clerk's job in the accounting department calls for no such display, nor are glass-lined re-

(*Turn to page 152*)

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Gretna, La.
No. Kansas City, Mo
Philadelphia, Penna.
Port Arthur, Tex.

Manion Steel Barrel Co.
Rouseville, Penna.

Myers Drum Company
Richmond, Calif.

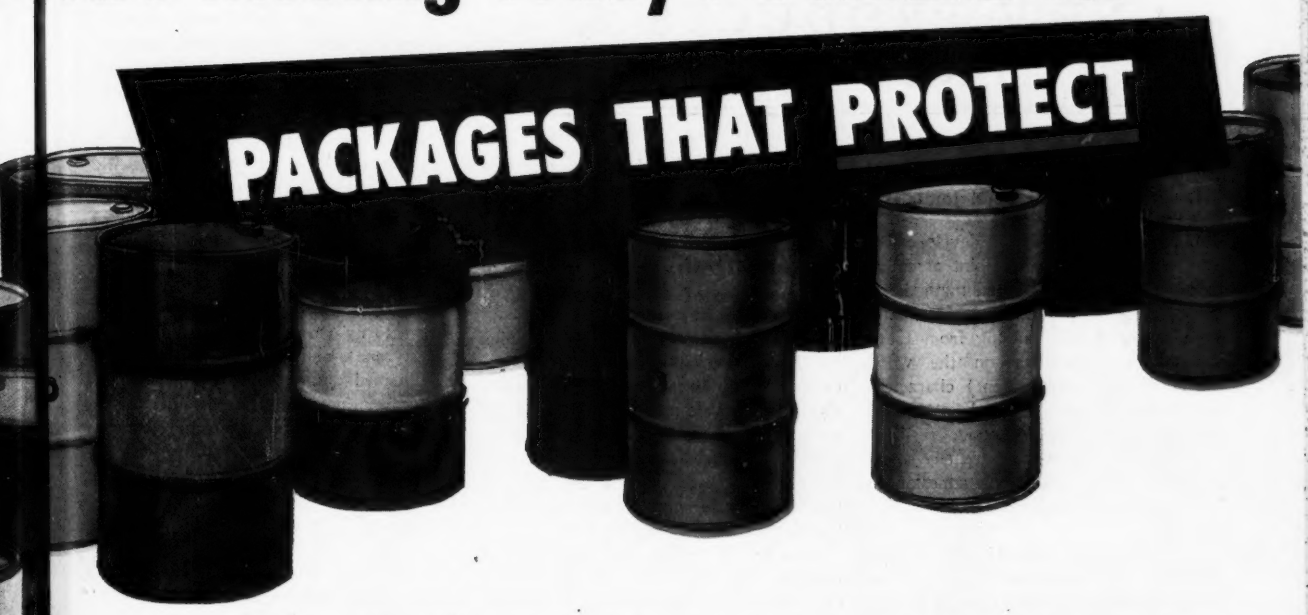
National Enameling & Stamping Co.
Granite City, Ill.
Laurel Hill, L. I., N. Y.

National Steel Container Corporation
Chicago, Ill.

Niedringhaus Metal Products Co.
St. Louis, Mo.

Niles Steel Products
Niles Plant—Stevens Plant
Niles, Ohio

Are Meeting Today's Demand for



TODAY, American industry is asking not only for *more* drums than ever before, but for drums which are so strong, well-constructed and perfectly equipped that they offer absolute security to their contents.

To meet the increasing *demand*, the steel shipping container industry has doubled its output in less than a decade—with an annual output of 1,000,000 tons of sheet steel—making it the second largest single user of sheet steel in America.

To maintain the highest standards of *quality*, drum manufacturers are now applying new techniques that assure smoother drums of greater strength and durability.

And to provide the *protection* which fine products require—protection from seepage, leakage and tampering—every drum manufacturer in the United States is equipped to install Tri-Sure Closures*.

Tri-Sure flanges, octagonal-shaped to prevent turning, are inserted at the time of manufacture and made an integral part of the steel container body.

Precision dies for this operation are in the plants of all drum manufacturers. By just specifying "Tri-Sure Closures" to your supplier, your drums are delivered with flanges that are as strong as the drum itself, and plugs which screw securely into the flanges — ready for your application of the leak-proof, tamper-proof, heavy-gauge Tri-Sure seals.

*The "Tri-Sure" Trademark is a mark of reliability backed by 26 years serving industry. It tells your customers that genuine Tri-Sure flanges (inserted with genuine Tri-Sure dies), plugs and seals have been used.

Play Safe by Specifying Tri-Sure Closures on Every Drum Order

AMERICAN FLANGE & MANUFACTURING CO. INC., 30 ROCKEFELLER PLAZA, NEW YORK 20, N. Y.

TRI-SURE PRODUCTS LIMITED, ST. CATHARINES, ONTARIO, CANADA

in drums equipped with **Tri-Sure** Reg. U. S. Pat. Off.

CLOSURES

EQUIPPED WITH TRI-SURE FLANGES AND PLUGS

The Ohio Corrugating Company
Warren, Ohio

Rheem Manufacturing Company
Bayonne, N. J.
Chicago, Ill.
Houston, Tex.
New Orleans, La.
Richmond, Calif.
South Gate, Calif.
Sparrows Point, Md.

Southern States Iron Roofing Company
Savannah, Ga.
Hattiesburg, Miss.

Southline Metal Products Company, Inc.
Houston, Tex.

Stainless & Steel Products Co.
St. Paul, Minn.

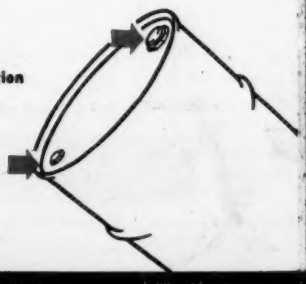
The F. C. Thornton Co.
Cleveland, Ohio

United States Steel Products Company
Alameda, Calif.
Beaumont, Tex.
Chicago, Ill.
Los Angeles, Calif.
New Orleans, La.
Sharon, Penna.

United Steel Barrel Corporation
Philadelphia, Penna.

United Steel Barrel Corporation of Delaware
Wilmington, Dela.

Wheeling Steel Corporation
Wheeling, W. Va.



NEW PRODUCTS & PROCESSES

Adhesives NP 824

Resin adhesive for wood joints sets in a half-hour.

National Adhesives has developed a resin adhesive that gears joint assembly operations to the high-speed methods of continuous flow production. Unusually rapid setting speeds ranging from 15 to 35 minutes (depending on the wood species and moisture content) characterize this new adhesive. Wood-Lok Q3022 sets with a moisture-resistant, resilient bond that will withstand extremely sharp impacts. It provides strong adhesion to such surfaces as Masonite and decorative laminates.

This combination of rapid setting speed plus unusual strength permits mass production where manufacturing capacity was formerly limited by slow-drying glues. Wood-Lok Q3022 may be machined, sawed, or hammered after approximately a half-hour's setting time.

The adhesive is ready-to-use as supplied. Since it sets with a non-crystalline unabrasive bond, re-sharpening costs of saws and downtime of machines are considerably reduced.

Metal Primer NP 825

Vinyl-base, quick-drying primer provides foundation for paint on metal surfaces.

To eliminate the necessity of having to remove all rust or to have the surface perfectly dry before painting, a combination chemical pretreatment and primer for metal has been formulated as Rust-O-Primer. A vinyl-base, quick-drying wet primer applicable over wet or dry, clean or rusted metal including steel, aluminum or galvanizing, its purpose is to provide a hard, paintable foundation for any type of paints including ship-bottom paints as well as vinyl-type finishes.

Styrene Resin NP 826

Copolymer of 75% styrene, 25% isoprene now in pilot plant.

An original development of the Union Bay State Chemical Co., Isopol is a hydrocarbon resin with moderately high molecular weight, made up of approximately 75 parts styrene and 25 parts isoprene. Isopol resin appears to offer some very definite advantages in various applications where ester gum, coumarone-indene and terpene resins are now used.

Now in pilot plant production, Isopol resin is clear, hard, nearly water-white in appearance, possesses many of the chemical properties of rubber, and is unique in that it is completely soluble in petroleum naphtha. It is best described as a modified polystyrene in which the isoprene acts as an internal plasticizer Thus the advantages of polystyrene have been retained (inertness, cost, color, etc.), while the disadvantage of brittleness has been partially eliminated.

Isopol resin may be used in a solution, in an emulsion, or as a solid. It is available at present only in solid form but may be offered in other forms if sufficient demand develops.

A promising use for Isopol is as a base in chewing gum. Here the resin in solid form is blended hot with suitable materials to give it proper plasticity and flavor.

Another possibility for the use of Isopol in its solid state is as a stiffener for rubber, both natural and synthetic. By nature the resin is close to rubber in chemical structure and as such can be milled and cured.

A final possible use of solid Isopol is as an ingredient in hot melt coatings. Here it is felt that the colorless, odorless and chemically inert characteristics of the resin should prove very valuable.

Since Isopol resin is readily soluble in low-cost naphthas, as well as aromatic hydrocarbons, chlorinated solvents, esters and ketones (except for acetone), it offers considerable possibilities in the coating field. Two outstanding advantages of the resin for use in this field are (1) that solutions of the resin may be sprayed satisfactorily (in contrast to solutions of polystyrene) and (2) that a film may be obtained without use of a plasticizer.

Another possible use of Isopol in solution is in the field of impregnating compounds. One manufacturer has reported that innersoles can be considerably stiffened by dipping them in a solution of the resin and then drying them.

Isopol resin may be readily emulsified and should prove extremely interesting in this medium.

Plasticizer NP 827

Polymeric plasticizer combines nonmigration and low-temperature usefulness.

Glyptal Plasticizer 2557 (*CI Newsletter, December 1948*) is a polymeric ester-type plasticizer with a low viscosity and a wide range of compatibilities. It combines many of the desirable features of both monomeric and polymeric plasticizers: for example, it is easily handled, efficient, permanent, heat-resisting, non-migrating, and useful at low temperatures. It is soluble in aromatic hydrocarbons, ketones, esters and alcohols; and insoluble in aliphatic hydrocarbons.

It is compatible with nitrocellulose, ethyl cellulose, cellulose acetate-butyrate, alkyd resins, acrylic esters, chlorinated rubber, and polyvinyl chloride-acetate. It should be classed as a secondary plasticizer for polyvinyl chloride. It is not compatible with urea- and melamine-formaldehydes, and polyvinyl formal and butyral.

Its properties are as follows:

Solids content	100%
Viscosity (G-H)	I-L
Viscosity (centipoises)	225-300
Color (Gardner)	7 max.
Acid number	5 max.
Pounds per gallon	8.5
Specific gravity	1.02
Congealing point	— 13° C.

m-Aminobenzotrifluoride NP 828

Fluorine compound useful as dyestuffs intermediate.

Pilot plant quantities of m-aminobenzotrifluoride are being manufactured by Hooker Electrochemical Co. The compound is of special interest as an intermediate in the manufacture of dyes.

CHEMICAL INDUSTRIES TECHNICAL DATA SERVICE

CHEMICAL INDUSTRIES, 309 W. Jackson Blvd., Chicago 6, Ill. (1-9)

Please send me more information, if available, on the following items. I understand that nothing further may be available on some of them.

NP 824	NP 828	NP 832	NP 836
NP 825	NP 829	NP 833	NP 837
NP 826	NP 830	NP 834	NP 838
NP 827	NP 831	NP 835	NP 839
			NP 840

Name ..... (Position) .....
(Please print)

Company .....

Street .....

City ..... (Zone) ..... State .....

significant data

on the use

of

BxDC*

(BUTOXYETHYL DIGLYCOL CARBONATE)

as a

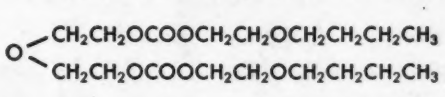
plasticizer

This new material has excellent properties as a plasticizer in typical vinyl resins and as a low temperature plasticizer for butadiene-acrylonitrile copolymers. It is also useful as a lubricant in Butyl rubber stocks compounded with the Columbia pigment Silene EF, or other non-carbon pigments. In this case, the addition of one to three parts BxDC per 100 of Butyl rubber appears to overcome the tendency of these stocks to adhere tightly to mixing or sheeting mills at processing temperatures in factory practice.

SEND FOR FREE BULLETIN—Properties of BxDC and data assembled on the performance of this plasticizer in a variety of applications are furnished in a newly published bulletin. Just write, requesting Columbia Plasticizer Data Sheet No. 48-2.

***GENERAL CHARACTERISTICS OF BxDC**

[Diethylene Glycol Bis (2-n-Butoxyethyl Carbonate)]



Butoxyethyl Diglycol Carbonate is a new, colorless, liquid organic plasticizer. It is substantially insoluble in water and is very stable to hydrolysis by water. Only neutral products and carbon dioxide can be formed upon hydrolysis. It is soluble in a wide range of organic solvents and is further characterized by excellent resin compatibility, low volatility and high plasticizing efficiency.

COLUMBIA CHEMICALS

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PITTSBURGH PLATE GLASS COMPANY

New Tools for Industry

for MANUFACTURERS of

Textile Finishes
Latex Compounds
Adhesives
Protective Coatings
Saturants

AQUAMERS

Water Soluble Resin Polymers

A new series of sodium and ammonium salts of high molecular weight polymers in aqueous solutions containing 25% solids. The sodium salt is designated as POLYCO 328 and the ammonium salt as POLYCO 329.

Suggested Uses

Excellent low-cost warp sizes.

Provide increased loom efficiencies because excellent weaving qualities result in less ends down.

Will not mold or change in viscosity on prolonged storage.

Excellent emulsifiers for the manufacture of stable oil-in-water emulsions.

Extremely effective in relatively small amounts as co-stabilizers for emulsions prepared with caps or synthetic detergents.

Effective thickeners for natural and synthetic latex.

Useful also as thickeners in textile printing paste and as additives in leather tanning.

Increasing wet strength of paper.

POLYCO 329 imparts smooth, crisp finishes to paper and textiles. Finishes can be rendered permanently water resistant by application of heat to remove the ammonia or by treatment with salts such as aluminum sulfate.

POLYCO 328, the sodium salt, may be made permanent by a metallic salt treatment.

Write today for Technical Data Sheet and Working Samples

POLYCO

AMERICAN POLYMER CORPORATION
PEABODY · MASSACHUSETTS

The trifluoromethyl group is chemically stable, but one or both of the hydrogens in the amino group may be substituted. Investigations reveal that other reactions including the possibility of further nuclear substitution may be carried out.

The compound is a colorless liquid with a characteristic aniline odor. Its molecular weight is 161.13; freezing point is 3° C; boiling point is 189° C and specific gravity is 1.303.

Latex, Plastisol NP 829

Two new products, a latex and a plastisol, will be used for coatings.

American Anode, Inc. is producing a new latex compound especially designed for applications requiring high heat resistance, and a new series of plastisols. These new products are called Anodex HR latex and Ameran resin paste.

Anodex HR possesses a combination of high heat resistance, good chemical resistance, high elongation, and high tensile strength. Articles coated, dipped, sprayed or brushed with Anodex HR possess the ability to withstand temperatures as high as 400° F. Potential applications for Anodex HR include heat resistant coatings for textiles and fabrics, such as radiator hose fabric, ironing board covers, insulating tapes and papers, heat and oil resistant gaskets, hose, belting, oil seals, and other mechanical applications.

The new series of Ameran resin pastes makes available to processors plastisol compounds that are free from entrapped air.

The new compounds may be used for coating metal and wire, plating racks, pipe lining, wood, textiles and paper; molding toys, industrial boots, and gaskets; or casting film and sheeting. They will be available in a wide variety of colors and will be formulated to customers' specifications.

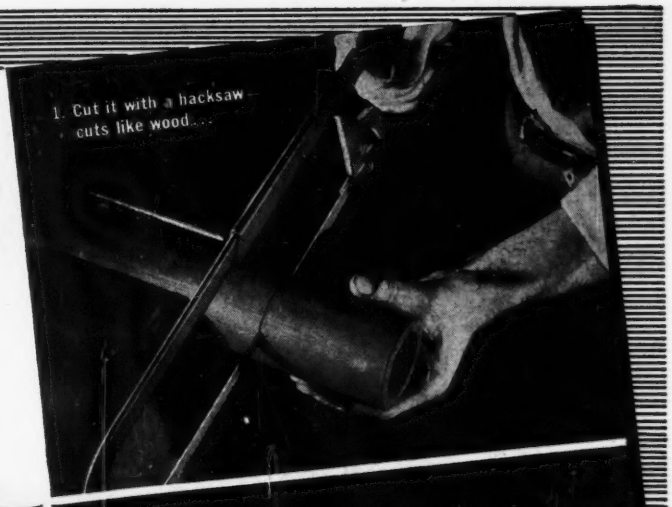
Wax Improvers NP 830

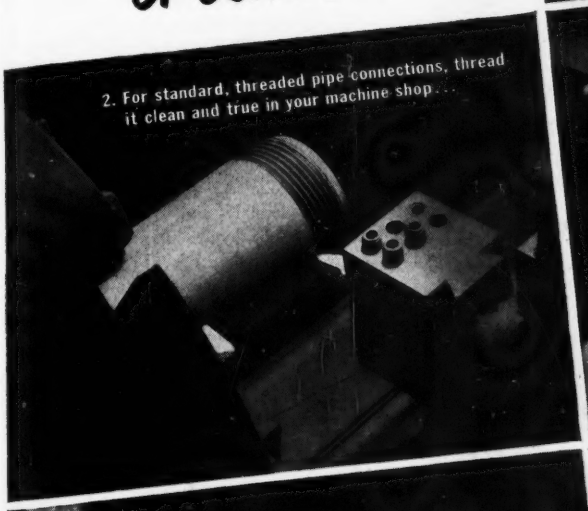
Polymers improve paraffin and microcrystalline wax coatings.

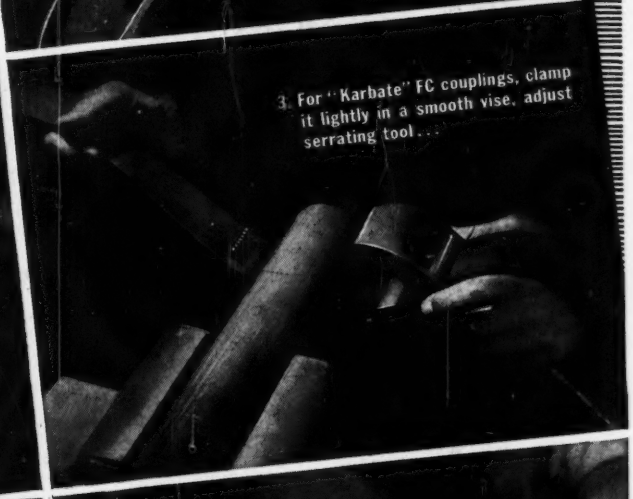
Three new types of Arwax concentrates of interest to users of paraffin and microcrystalline waxes have been announced by American Resinous Chemicals Corp. The new products are concentrates of polyethylene, butyl rubber or S-Polymer in paraffin or microcrystalline wax and supplement the first series of Arwaxes which were Vistanex concentrates.

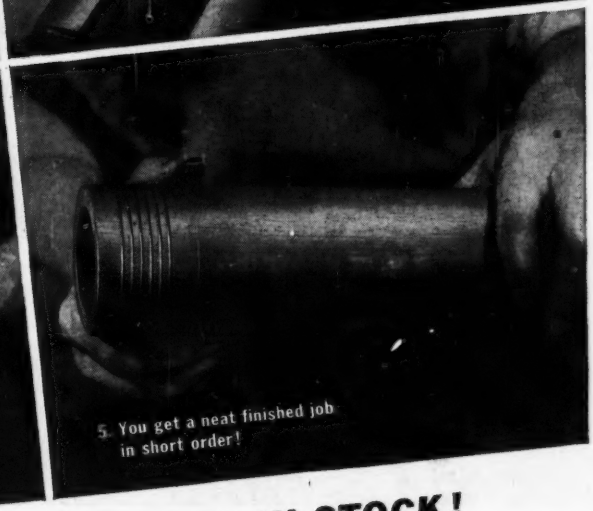
The polyethylene concentrates improve the grease-resistance and gloss of paraffin coatings while raising the block point. High and medium molecular-weight polyethylene concentrates increase tensile strength more than do any other type of Arwax.

"KARBATE" Impervious Graphite Pipe is easy to cut...thread... or serrate!









KEEP "KARBATE" PIPE ALWAYS IN STOCK!

- Resists the action of acids, alkalis and other chemicals
- Light weight with adequate strength
- Resistant to mechanical shock
- Immune to thermal shock
- Easy to machine and install
- Full range of sizes and fittings

Write for catalog section M-8800B to National Carbon Company, Inc., Dept. CI.

The term "Karbate" is a registered trade-mark of
NATIONAL CARBON COMPANY, INC.
Unit of Union Carbide and Carbon Corporation
UCC

30 East 42nd Street, New York 17, N. Y.
Division Sales Offices:
Atlanta, Chicago, Dallas, Kansas City, New York, Pittsburgh, San Francisco

These products sold in Canada by Canadian National Carbon Co., Ltd., Toronto 4, Canada

Producers of

SULPHUR

Large stocks at our mines make possible prompt shipments

Uniformly high purity of 99½% or better

Free of arsenic, selenium and tellurium

TEXAS GULF SULPHUR CO. INC.

75 East 45th St. New York 17, N. Y.

Mines: Newgulf and Moss Bluff, Texas

Butyl rubber concentrates enable the wax compounder to improve tensile strength, increase flexibility and adhesion at a lower cost than is possible with Vistanex. Another advantage of Butyl concentrates, as compared with Vistanex, is lower viscosity at higher polymer concentrations. This allows greater ease of application.

The S-Polymer concentrates of Arwax provide dry, tough and less rubbery wax coatings than the polybutenes; but the coatings are still flexible and have good resistance to MVT.

Emulsifiers NP 831

Polyoxyethylene emulsifiers are stable to alkali and acid.

Atlas Powder Company is announcing two new surface-active agents under the trade name Brij. They are for use in emulsifying or wetting where stability to high alkalinity or acidity is of primary importance. Samples and commercial quantities are available.

Both products are polyoxyethylene lauryl alcohols. Brij 30 is generally water-dispersible and oil-soluble, being slightly more hydrophilic than Span 20 (sorbitan monolaurate). Brij 35 is water-soluble, and compares in hydrophilic characteristics to Tween 20 (polyoxyethylene monolaurate). The following are general characteristics of the Brij products:

Properties	*Brij 30*	*Brij 35*
Form at 250° C.	Oily Liquid	Waxy Solid
Viscosity (cp. at 250° C.)	25-125	.....
Titer (° C.)	.....	35-36
Specific Gravity	0.92-0.98	1.18-1.22
Color	Lemon	White

Insecticide NP 832

Chlorinated hydrocarbon is active insecticide, stable in alkaline solutions and emulsions.

Compound 118 is a new insect toxicant discovered and recently introduced by Julius Hyman & Co. In preliminary laboratory and field tests on a variety of test insects, it has been found to equal or exceed the insecticidal activity of the gamma isomer of benzene hexachloride at effective dosage levels. The compound exhibits residual activity comparable to that of chlordane. It does not show rapid paralytic action.

Compound 118 has the following formula: 1,2,3,4,10,10-hexachloro-1:4,5:8-diendomethano - 1,4,4a,5,8,8a - hexahydronaphthalene. No common name has yet been designated. It is soluble at room temperature in all of the common organic solvents, including highly refined paraffinic hydrocarbons.

The compound is considerably less volatile than the gamma isomer of benzene hexachloride. It is stable in the presence of strong alkali and appears to be so in the presence of metallic chlorides. It also appears to be stable in sunlight

From SHELL CHEMICAL

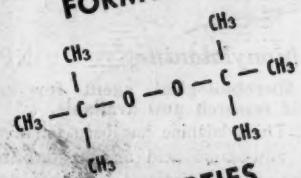
...in commercial quantities

new, exceptionally stable polymerization catalyst of high purity

Di-Tertiary-Butyl Peroxide

...for resins of finer color and clarity

FORMULA



PROPERTIES

Molecular Wt.	146.22
Boiling Pt. (760 mm)	111°C
Spec. Gravity 20°/4°C	0.800
Refr. Index, n_D^{20}	1.389
Flash Pt. (Tag Open Cup)	65°F
Solubility in water, 20°C (wt.%)	<0.1%

DI-TERTIARY-BUTYL PEROXIDE offers resin manufacturers an exceptionally stable polymerization catalyst *with a purity of 97%*. This new, liquid organic peroxide is insensitive to shock. It can be stored for long periods of time at temperatures up to 80°C. without change in composition or danger of explosion. Because of this stability, DTBP can be safely handled in far higher concentrations than most peroxides.

Activation is governed solely by temperature and is independent of the reaction media. This permits very accurate control of quality during polymerization reactions. Resins of superior color and clarity are obtained because splitting of DTBP into free radicals—which initiate chain polymerization—does not leave any harmful residues.

DTBP is soluble in most resin-forming monomers. It is an effective catalyst in polymerization reactions carried out at temperatures above 100°C.

DTBP is now available in commercial quantities.

Among the many other products manufactured by Shell Chemical are Methyl Isobutyl Ketone, Methyl Isobutyl Carbinol and Acetone.

A letterhead request to any Shell Chemical district office listed below will bring you technical literature and a sample.

SHELL CHEMICAL CORPORATION

100 Bush Street, San Francisco 6 • 500 Fifth Avenue, New York 18
Los Angeles • Houston • St. Louis • Chicago • Cleveland • Boston • Detroit

WE'VE DONE IT FOR VETERINARIANS

SINCE its introduction as a general purpose deodorant some sixteen years ago, NEUTROLEUM has been put to hundreds of interesting uses. One of these is the control of animal odors. Placed in the corners of cages, kennels or animal houses, a drop or two of this very efficient low-cost deodorant helps to maintain a clean, fresh atmosphere about the premises of zoos, pet shops, veterinary hospitals and the like. Its proper use, coupled with a rigid program of cleanliness, will go a long way toward removing the problem of animal odors as a matter of concern for the veterinarian, zoo keeper or kennel operator.

PERHAPS WE CAN DO IT FOR YOU!

Unpleasant industrial odors are a frequent source of annoyance, discomfort and expense to manufacturers. As the by-product of chemical process or manufacture, an offensive odor can be detrimental to personnel efficiency and morale; as residual odor in the finished goods, it can greatly retard that product's sale. In either case, the presence of such odor is not only costly, but *unnecessary*, for as likely as not it can be modified or entirely eliminated by the use of appropriate deodorants. NEUTROLEUM may not be the answer, but we have dozens of other neutralizing specialties from which to choose. And if none of these will do, our technical staff is well equipped to study the problem and work out an effective solution. Therefore, if you or your company are faced with an industrial odor problem, it will obligate you in no way to explain it to our Technical Division and find out if they can solve it for you.

FRITZSCHE *Brothers, Inc.*

Est. 1871

PORT AUTHORITY BUILDING, 76 NINTH AVENUE, NEW YORK 11, N. Y.

BRANCH OFFICES *and* *STOCKS: *Atlanta, Ga., *Boston, Mass., *Chicago, Ill., Cincinnati, O., Cleveland, O., Dallas, Tex., Detroit, Mich., *Los Angeles, Calif., Philadelphia, Pa., San Francisco, Calif., *St. Louis, Mo., *Toronto, Canada and *Mexico, D. F.*
FACTORY: *Clifton, N. J.*

and air. It is nearly odorless at room temperature and possesses a characteristic mild, pine-like odor when warmed.

Much remains to be learned on its compatibility but at present this compound appears to be compatible and safe to use with the other insecticides and with available fungicides. In contrast to all of the presently available halogenated hydrocarbon insecticides, Compound 118 is completely stable to the action of both inorganic and organic alkaline materials both in aqueous and non-aqueous solutions and suspensions.

Carburizing Aid NP 833

Paste isolates portions of work while selected areas are case-hardened.

A material for keeping part of a workpiece soft while the rest is carburized has been developed by Denfis Chemical Laboratories, Inc. Known as Isopac, it is a paste that is applied to the sections to be kept soft and left in place while the work is case-hardened.

Isopac prevents the penetration of gas and insulates the protected section to prevent rapid cooling. The paste is easily removed after the work is quenched. It will replace copper plating or other expensive and time-consuming methods of isolating sections to be kept soft. The new paste will neither crack nor shrink and is guaranteed to give effective results.

Thienylalanine NP 834

Microbiological agent for amino acid research now available.

β,2-Thienylalanine has been found to be an anti-amino acid and as such is attracting much interest in microbiological and nutritional studies. It is used in medical and biological laboratories as a specific antagonist toward phenylalanine in the metabolism of a number of organisms. This white soluble odorless powder is now available for stock delivery from Arapahoe Chemicals, Inc.

Plating Process NP 835

Copper plating method employs no cyanide nor hot baths.

An improved acid copper bath which makes possible plating speeds up to .001 inch in 10-15 minutes, and which eliminates the faults inherent in the original method, has been developed by Dayton Bright Copper Company.

The Daybrite method, as it is called, employs no cyanide or hot baths and, because it gives off no offensive fumes or odors, requires no ventilation. The smooth, dense deposits tend to fill out minor defects in the base metal, increasing corrosion resistance and simplifying or eliminating buffing operations before

Enjay will help you!

Are you looking for an oxygenated solvent or hydrocarbon to meet unusual requirements? Whatever your compounding problem, ENJAY'S technical staff is ready to help you get the most out of our products. They are also prepared to work with you in developing new uses for various ENJAY chemicals.

Supported by the nation's largest and most modern petroleum research laboratories, new ENJAY products are constantly being developed and standard products improved. One of them, listed below, may be just what you need. For information, write today.

ENJAY SOLVENTS

PETROHOL* Isopropyl Alcohol (91%, 99%)—$CH_3CHOHCH_3$
Secondary Butyl Alcohol—$CH_3CHOHCH_2CH_3$
Isopropyl Acetate—$(CH_3)_2CHCOOCH_3$
Secondary Butyl Acetate—$CH_3(C_2H_5)CHCOOCH_3$
Isopropyl Ether—$C_3H_7OC_3H_7$
Methyl Ethyl Ketone—$CH_3COC_2H_5$

ENJAY HYDROCARBONS

Butadiene—$CH_2:CHCH:CH_2$
Isobutylene—$CH_2:C(CH_3)_2$
Diisobutylene—$CH_2:C(CH_3)CH_2C(CH_3)_3$†
Triisobutylene—$CH_2:C(CH_3)CH_2C(CH_3)_2CH_2C(CH_3)_3$†

† *Other isomers also present.*

CTLA POLYMER — An economical heat-reactive, aromatic-type olefinic hydrocarbon. Highly unsaturated. Dries by polymerization and oxidation. Miscible in all proportions with drying oils. Compatible with most resins.

ENJAY

*Registered Trade Mark

ENJAY COMPANY, INC.
Esso Building, 15 West 51st Street
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Effective January 1, 1949, the

INDOIL CHEMICAL COMPANY

a wholly owned subsidiary of the

STANDARD OIL COMPANY
(INDIANA)

will take over the personnel and sales activities of the Chemical Products Department of the parent Company. This move will permit more efficient handling of our chemical business on a nation-wide basis.

INDONEX Plasticizers
INDOPOL Polybutenes
INDOCENE Aromatics
ALKANESULFONIC Acids
INDOIL Sulfonates and other
INDOIL Chemical Products

We take this opportunity of expressing appreciation of our past pleasant relations, and our hope of expanded but equally pleasant future relations.

INDOIL CHEMICAL COMPANY
910 South Michigan Avenue
Chicago 80, Illinois

INDOIL®
CHEMICAL PRODUCTS

the nickel plating cycle, thus reducing polishing time and costs. Daybrite is also suited to applications in electroforming operations, particularly the recording industry, where its inherent fine grain and tensile properties are especially beneficial.

Complete installation service is available through the company and its representatives.

Dry-Cleaning Aid NP 836

Dry-cleaning detergent formulated for use in all types of equipment.

A new product, "Ovalclene," is a synthetic dry-cleaning detergent which was developed by Du Pont's Electrochemicals Department as a formula suitable in all types of dry-cleaning equipment. "Ovalclene" is a balanced detergent, compounded for systems using either synthetic or petroleum solvents.

Tests under actual service conditions indicate that "Ovalclene" dry-cleaning detergent removes soil thoroughly and quickly at low cost. It is also excellent for preliminary cleaning of spots on textiles.

Enamel Strippers NP 837

Two new strippers remove synthetic finishes from metal parts.

Enthone, Inc., has announced the development of two new room-temperature strippers for synthetic enamels, Strippers S-17 and S-19.

Stripper S-17 is a clear, quick evaporating stripper used at room temperature for removal of all types of synthetic enamels, including heavy coatings of enamels that accumulate on work holders and hooks. For such cases, the various layers of enamel exfoliate, leaving the work holders clean. Stripper S-17 is particularly recommended for the removal of clear synthetic enamels from highly polished surfaces, such as brass, gold plate and silver. It does not tarnish metals and it has no significant odor to annoy workmen.

The other stripper, Stripper S-19, is similar to Stripper S-17 in its action and appearance except it is slightly ammoniacal in composition and is used in certain special cases for removal of synthetic enamels where Stripper S-17 is not satisfactory. Both strippers are used with water seals to minimize evaporating losses, and rinsing is not necessary after the use of these strippers to remove the coating.

The work to be stripped is merely immersed in the strippers at room temperature. After a few seconds to several minutes, the enamel is completely removed from the surface of the metal and the parts can be removed. The stripper evaporates quickly and the part is ready for refinishing.

A page from the Stauffer Catalog

NUMBER TWO IN A SERIES

BORAX

Other Names . . . . Sodium Tetraborate, Sodium Borate Decahydrate, Biborate of Sodium.

Formula . . . . . $Na_2B_4O_7 \cdot 10H_2O$.

Properties . . . . . White solid, crystals or powder. Specific gravity 1.73 @ 20°/4°C. When heated there is a gradual loss of water of crystallization with melting between 75° C. and 200° C. Fuses to a glassy mass at red heat. Solubility in water and glycerine is limited; a saturated solution at 20° C. (68° F.) contains 2.6% $Na_2B_4O_7$. Water solutions are slightly alkaline; pH = 9 with 1% $Na_2B_4O_7$ in water. Solutions are mildly antiseptic and non-toxic to handle. The salt is slightly efflorescent in warm, dry air. The bulk density is approx. forty-five pounds per cu. ft.

Grades . . . . . Technical, 99½% - 100% pure — Fine Granulated and Powdered. U.S.P. — Fine Granulated and Powdered.

Analysis (Typical) .

	Technical	*U.S.P.*
Sodium Borate ($Na_2B_4O_7 \cdot 10H_2O$	100.3 to 103.0%	100.3 to 104.0%
Boron as B_2O_3	36.5 to 37.6%	36.5 to 37.9%
Chlorides as NaCl	0.04 to 0.06%	0.015 to 0.03%
Iron as Fe	3 to 8 Ppm	2 to 4 Ppm
Arsenic as As_2O_3	4 to 8 Ppm	2 to 6 Ppm
Carbonates and sulphates	nil	nil

Principal Uses . . . . Borax is a useful fluxing agent in glass, enamel frits, and in pottery glazes. Likewise in the refining of gold. It is a mild food preservative, and a mild alkaline antiseptic useful in dentifrices. Borax is a desirable alkali for use in textile and tanning baths; it is a useful peptizing agent in dissolving casein. It is the natural starting material for the manufacture of a host of inorganic and organic chemicals. It is an effective herbicide and one of the important minor fertilizer elements.

	Net	*Tare*	*Gross*
Packing . . . . . 6 ply Paper Bags	100 lbs.	1 lb.	101 lbs.

Also bulk carloads.

Shipping Regulations None.

Stocks . . . . . Westend and San Francisco, Calif.; North Portland, Ore.; Chicago, Ill.; Apopka, Fla.

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DDT—(Dichloro-Diphenyl-Trichloroethane)
BHC—(Benzene Hexachloride)
Toxaphene—(Chlorinated Camphene)
Boric Acid
Cream of Tartar
Tartaric Acid
Citric Acid
Titanium Trichloride
Carbon Bisulphide
Carbon Tetrachloride
Caustic Soda
Chloride
Silicon Tetrachloride
Sulphur
Sulphur Chloride
Textile Stripper
Sulphuric Acid
Sodium Hydrosulphide

Reg. T. M. Hercules Powder Co.

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METALLIC BACKING CLOTH

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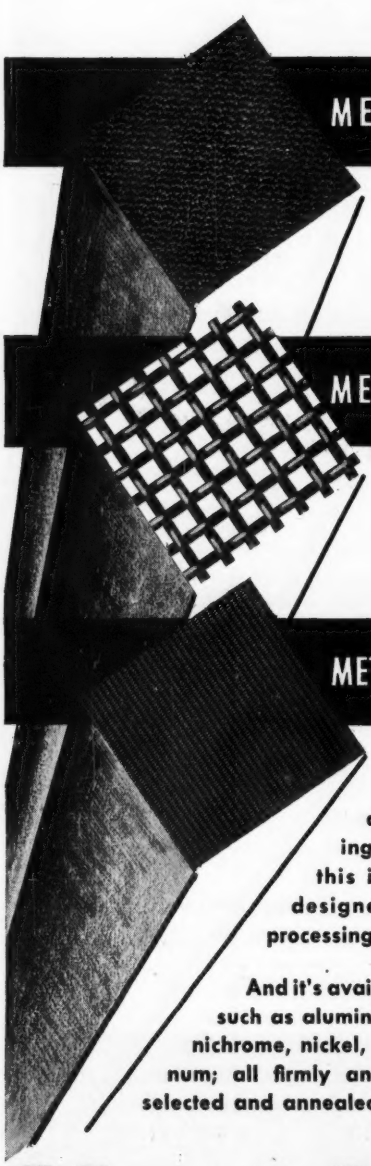
METALLIC CENTRIFUGAL CLOTH



If you are looking for an accurate, durable metallic cloth for your filtering requirements come to Newark. For this is a "brand name" of wire cloth designed to stand-up under heavy duty processing service.

And it's available in the finest of meshes, in metals such as aluminum, brass, phosphor bronze, Monel, nichrome, nickel, stainless steel, gold, silver, or platinum; all firmly and uniformly woven from carefully selected and annealed wire.

Newark Wire Cloth COMPANY

345 VERONA AVENUE • NEWARK 4, N. J.

Detergent NP 838

Alkyl aryl sulfonate solution gives fast wetting, high detergency.

A new low-cost liquid wetting agent and detergent of the alkyl aryl sulfonate type is now being made by Monsanto Chemical Company. A pale lemon viscous fluid, it is sold under the Monsanto trademark Santomerse 30-X.

The product is especially designed to give quick and effective wetting at low unit cost, and will be of particular interest to the textile industry.

The product is a clear, extremely light-colored solution, containing 30% solids. The solids content is made up of approximately 85% active alkyl aryl sulfonate and 15% sodium sulfate. It has remarkable resistance to decomposition by either strong acids or alkalies, even under extreme conditions.

Santomerse 30-X liquid wetting agent is recommended for wet processing of textiles and many other applications where surface tension reduction and quick wetting is desired. Its attractive color, viscosity and high detergent value also make it well suited for liquid cleaning compositions.

Thiosemicarbazide NP 839

Intermediate and analytical reagent now made in pilot-plant quantities.

National Biochemical Company announces the first commercial availability of the analytical reagent, thiosemicarbazide, in pilot plant production. It is offered as either the free base or the hydrochloride. The free base is available in pure and technical grades and the hydrochloride is available in the pure grade.

Coumarins NP 840

Two coumarins derived from phloroglucinol may find use in soaps, cosmetics, paints, dyes, and pharmaceuticals.

Two new phloroglucinol derivatives, announced by Edwal Laboratories, Inc., have properties of interest to the cosmetic, soap, paint, dye, plastics and pharmaceutical industries.

5,7-Dihydroxy-4-methyl coumarin is fluorescent, absorbs ultra-violet light, prevents sunburn, hence is of use in suntan oils and creams used as sun screens. The compound has distinct uses as a whitening agent and gives a gleaming white color to clothes and wall paints. Small proportions added to yellow plastic, for example, will give a white or clear product. It is also structurally similar to coumarin compounds used in anti-coagulants.

5-7,-Dihydroxydimethyl coumarin is similar in physical properties to the monomethyl compound. Suggested uses are similar.

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Wider Selection Means you can order virtually all your reagent chemical requirements from the same source, at the same time. This is the economical way . . . the time-saving, easier way. More than 1,000 purity products of Reagent A. C. S., C. P., U. S. P., N. F., and Technical grades carry the B&A "Shield of Quality" label.

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* Complete stocks are carried here.

NEW EQUIPMENT

Control Station QB703

New miniature control station indicates process, control-point, and valve pressures.

Moore Products Co. has developed a new miniature-panel control station for graphic panels, consoles, and standard panelboards. This is for use with the manufacturer's remote-set-type Nullmatic controller.

The Nullmatic M/P control station requires only 4⅛" x 4¾" of panel space—yet indicates process, control-point, and valve pressures. It includes transfer switches for "bumpless" manual-automatic changeover.

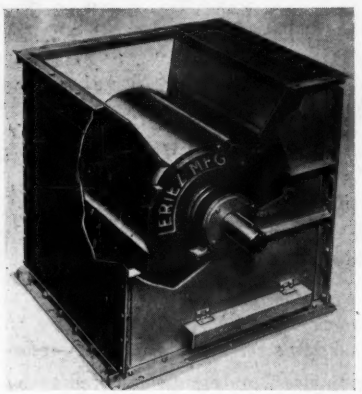
The new control station includes a Nullmatic pressure regulator and a new duplex indicator containing two Bourdon tubes. A black pointer indicates the process value. A red pointer, which travels around the periphery of the dial, normally indicates the control-point-setting pressure. When a spring-return switch is thrown, this red pointer indicates the pressure on the diaphragm valve.

The manual-automatic switch has a seal position which "locks in" the existing control. When the switch is in this position, the operator can set the valve pressure before he changes to manual—or he can set the control-point pressure before he changes to automatic. In switching either way, he avoids any "bump" to the process.

Magnetic Drum QB704

New Eriez magnetic drum uses Alnico magnets.

The first, completely self-energized magnetic drum requiring no electric current to produce a magnetic field is announced by the Eriez Manufacturing Co. Powered by Eriez designed Alnico magnets, the unit is highly adaptable for the automatic removal of tramp iron and fine ferrous contamination.



Eriez drum separators consist of a revolving cylindrical shell within which a stationary high-powered permanent non-electric magnet is located. The magnet covers about half the cross sectional area of the drum. Material is fed onto the drum shell. Non-magnetic material is discharged first and separately, while the magnetically susceptible portion is held against the shell until it passes out of the magnetic field.

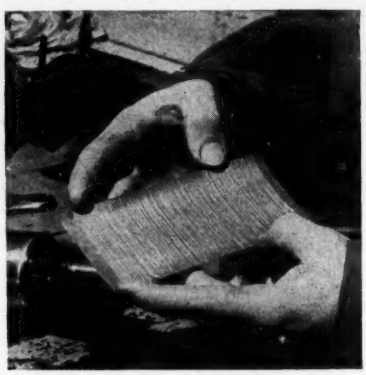
The unit is available in 18 different sizes including 12", 18" and 24" diameters and in drum widths up to 50". The drum may be ordered as a separate unit or complete with housing. Both are furnished ready for installation. Drum and housing are fully enclosed, fully automatic and of all metal construction.

Recording Chart QB705

New coated metal recording chart will operate well under extreme conditions.

Otis Engr. Corp. has developed a new type coated metal recording chart for use in meters and recording instruments which are installed to operate under extreme temperature, pressure, and other adverse physical conditions.

The Otis coated metal recording chart will not shrink, expand, deteriorate, or become deformed under atmospheric changes or by contact with moisture, hydrocarbons, or corrosive elements, nor will the patented coated surface crack, peel, or flake. The coated surface is extremely sensitive to very light stylus.



Charts are now being manufactured in thicknesses of .002" to .003", and can be made as thin as .001" to .0015", if desired. The chart material, available without measurement or division markings, can be trimmed to close tolerances and fitted flush into the working parts of an instrument or meter, thus eliminating the common fault of slippage and deviation usually found in the use of other types of charts

Spray Dryer QB706

New table model laboratory spray dryer provides operating air temperature of 750 F., centrifugal atomization, and ready demountability.

Bowen Engineering, Inc. has developed a new laboratory spray dryer for laboratory development work and small lot production. The new Bowen unit retains the desirable features of the original Bowen laboratory spray dryer, compact

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Please send me more information, if available, on the following items. I understand that nothing further may be available on some of them.

QB703	QB707	QB711	QB714	QB718	QB722	LE108
QB704	QB708	QB711a	QB715	QB719	QB723	LE109
QB705	QB709	QB712	QB716	QB720	QB724	LE110
QB706	QB710	QB713	QB717	QB721	QB725	LE111

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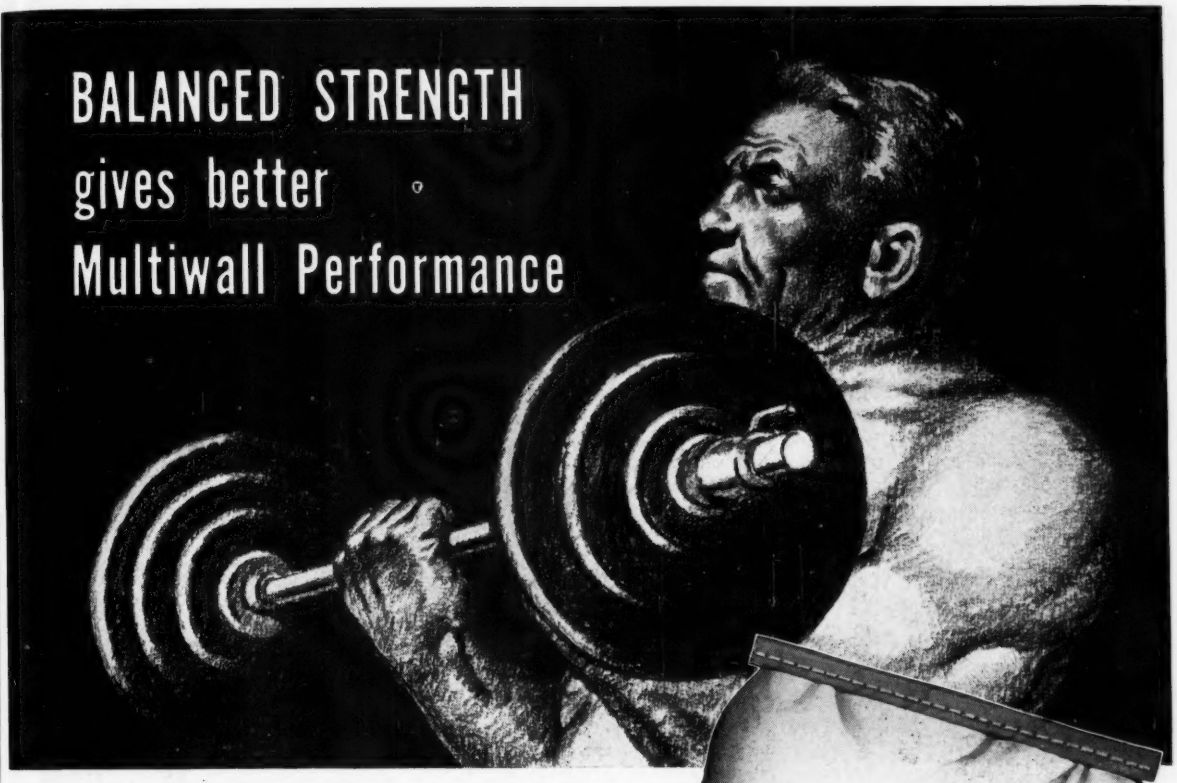
BALANCED STRENGTH gives better Multiwall Performance



BALANCED STRENGTH of Bemis Multiwall Paper Shipping Sacks is the result of control of paper quality plus careful manufacturing methods. Always specify Bemis Multiwalls for chemicals.

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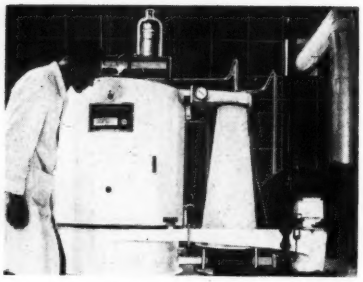
BEMIS BRO BAG COMPANY

construction, centrifugal atomization and ready demountability for clearing, plus:

1. A new furnace provides operating air temperature up to 750° F. This enables about 30% increase in evaporation rate of dryer.



2. Increased diameter feed pipe will handle viscous solutions or slurries for investigations that were previously possible only in large dryers.

3. Stainless steel ducts between gas heater and drying chamber.

pH Control QB707

pH control in a non-sensitive area is controlled by adding sufficient acid or base to bring it into a sensitive area and then measuring.

In many processes the strength of a caustic or acid solution must be controlled within limits where there is relatively little change in variables that lend themselves to conventional control. For example, the change in pH (or other) value between the desired control limits would be on the flat part of the titration curve with a negligible change in pH for a relatively large change in concentration. Thus pH change would not be detectable or controllable to measure by direct methods.

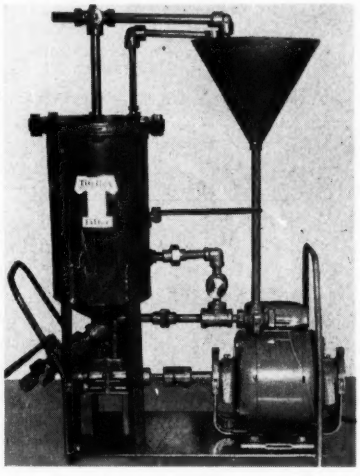
To meet such requirements the Milton Roy Co. has developed an automatic titrating system utilizing a duplex controlled volume pump to titrate automatically a sample continuously from the liquid bath. A sample of the liquid from the bath is handled on one side of the pump and a fixed quantity of titrating medium metered to that sample in direct ratio and exact proportion.

For example, if control were desired on a caustic bath, phosphoric acid might be used for the titration with the second side of the duplex pump handling a standard solution of phosphoric acid proportional to the caustic sample delivered by the first side of the titration unit. The mixture of the two reagents would give a pH value on the steep portion of a curve and directly indicate the strength of the caustic bath. A pH meter measuring this pH value would automatically set the feed of strong caustic to the caustic bath to maintain the desired standard strength of caustic required.

Portable Filter QB708

New filter is self-cleaning and can handle a maximum of 275 gph.

A small, compact, portable filter has been developed by Titeflex, Inc. Known as Model L50E, it is 17″ long by 8″ wide by 26″ high and weighs approximately 70 pounds. It is available in stainless steel, brass, iron, and Saran, with rubber lined tanks, and can be used on any chemical solution. This model has a small positive



displacement pump rated at 275 gph. and powered by a ⅓ hp motor.

This unit can easily be carried from tank to tank for batch work or can filter continuously on a specific tank, is self-cleaning (does not have to be taken apart for cleaning), and requires no parts, such as bags, sheets, or pads.

• QB709 With the new Measure-Matic of Gustin-Bacon Mfg. Co., even unskilled workers can consistently make accurate *thickness measurements* of fibrous materials. Fibrous mats and blankets are placed on the table of the Measure-Matic, and the platen lowered until it rests lightly on the material. A dial-indicator records the thickness of the material within 1/100 of an inch. Resilience of compressible and deformable materials can also be measured quickly and simply with the Measure-Matic.

• QB710 A handy *dry chemical fire extinguisher* containing two pounds of Ansul Plus-Fifty dry chemical has been designed for effective use by inexperienced operators. In the small extinguisher field, the Ansul "Emergency Fireman" is said to provide maximum protection for flammable liquid and electrical fires. It is rechargeable on the spot after use.

• QB711 The Ertel Eng'r. Corp. has developed a new *positive seal cylinder type disk filter,* Model ECD. The filter incorporates a new principle of double closure to insure a positive seal. The

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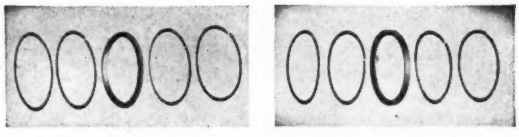

PALMETTO G-T *Piston Assembly* **PALMETTO G-T** *Rod Assembly*

Extrusion of packing material into clearance between mating parts *absolutely eliminated* by new Greene, Tweed Palmetto G-T Ring Packing!

Designed for aircraft reciprocating and static hydraulic service to 10,000 psi . . . proven wherever a positive seal is required . . . temp 250 F to —70 F . . . fits all except rotary systems. Write for free descriptive bulletin TB-918.

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Contact your fully-stocked Palmetto distributor on all packing problems . . . ask him about our special tools.

CHEMICO *has the experience in the design and construction of* SYNTHETIC AMMONIA PLANTS

"There is no substitute for experience." That's particularly true when it comes to designing and constructing plants for the production of synthetic ammonia. For more than twenty years Chemico, utilizing the well known N. E. C. Process, has been the leading builder of this type of installation.

Today, Chemico helps in the fight to feed the world by designing and supervising the construction of complete plants for the production of nitrogenous fertilizer.

IN INDIA . . . 350,000 tons a year of ammonium sulfate will be produced by a plant at Sindri to be operated by the Indian government.

IN EGYPT . . . every day 550 tons of calcium nitrate will flow from the great plant at Suez . . . to be built for the Societe Egyptienne d'Engrais et d'Industrie Chimiques (S. A. E.).

IN MEXICO . . . 70,000 tons of low-cost ammonium sulfate will flow from a new plant near Mexico City to be built for Guanos y Fertilizantes S. A., Mexico's leading fertilizer manufacturer.

In other strategic places throughout the world—as well as in the United States—Chemico is helping to meet the need not only for fertilizer, but also for sulfuric acid, synthetic ammonia, synthetic methanol and other heavy chemicals.

In each of these projects the Chemico organization functions as Architect-Engineers in charge of design, procurement of equipment, supervision of construction, training of personnel and initial operation.

Chemico's extensive experience in these and hundreds of other installations is your guarantee of performance . . . your assurance of economical and efficient operation.

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Cables: Chemiconst, New York

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filtering elements are independently tightened from the cylinder. This method permits the use of various types of rigid filter media in any number up to the rated capacity of the filter.

Due to complete enclosure there is no loss of liquid by evaporation or drippage. Model ECD is built so the filter effects a positive seal between the filter medium and the inlet and outlet channels.

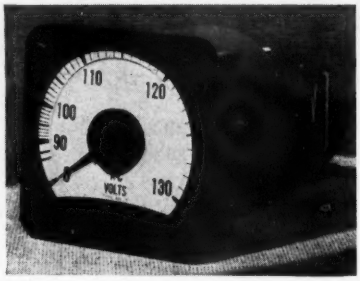
• QB711a A new, inexpensive *respirator* for protection against nuisance dusts is announced.

The R-2900, the latest addition to the respirator line of the American Optical Co., Southbridge, Mass., is designed to protect against light concentrations of nuisance dusts.

The design allows unobstructed front and side vision. Filter is lightweight, inexpensive and easily replaced and the retainer cup is light and durable. The face mask is molded from high quality rubber and fits comfortably.

• QB712 A D-C *power supply* with output voltage regulation better than 0.1% and ripple less than 0.01% is now being produced by the Hastings Instrument Company, Inc. The precision-regulated power supply is adjusted by the manufacturer for optimum regulation at any specified load of from 5 to 30 milliamperes and for any output voltage from 0 to 100 volts. Regulation is thus obtained within ± 0.1% for input line voltages varying from 75 to 135 volts A-C at frequencies from 50 to 400 cycles per second.

Indicating Voltmeter QB713



The new G-E indicating voltmeter with an expanded scale which has been added to the Type AB-15 line of General Electric. The scale is expanded in the most frequently used range, from 90 to 130 volts, thereby enabling easy detection and measurement of 0.5-volt variations within that range.

• QB714 Motor and pump are combined into one assembly, the Monobilt, in a new *turbine type pumping unit* of the Roy E. Roth Co. The capacity of the pump is 2 to 10 gpm. Special features of the Monobilt are replaceable heads and impellers, facilitating repairs when needed and also providing means for changing capacities if desired; no coupling noise; and a mechanical seal eliminating packing.

Three standard constructions are available: bronze-fitted, all iron and all bronze. They are equipped with a single phase motor, 110-220 volt, of the 60 cycle capacitor type, with ball bearing construction and stainless steel shaft. All motors except ¼ H.P. are dual voltage. The ¼ H.P. is 110 volt only.

• QB715 Filtration Engineers, Inc., are producing *nylon and Vinyon-N filter fabrics,* with complete facilities for tailoring the cloths to fit any rotary vacuum or pressure filter, or filter press.

Nylon cloths are very resistant to acids, alkalies, and bacterial action. Nylon fabrics not only save in replacement costs but also in the expense of "down time" for the more frequent changes of ordinary filter cloths. Greater strength and resistance to abrasion and mechanical abuse often permit use of a lighter cloth, which is usually more efficient than a heavier cloth.

These new Vinyon-N fabrics are remarkably acid-resistant, and are especially recommended where hot acids are involved. They also possess superior resistance to alkalies and bacterial action. Easy to clean, non-blinding, they will last considerably longer than previously available cotton cloths. FEinc Vinyon-N filter cloths are tailored to fit most types of filters, including all rotary filters.

• QB716 New Dynatherm *resistance* bulb of Foxboro Co. is now in full-scale production. The Dynatherm bulb is a standard product which is suitable for any installation for operating temperatures below 600° F. It can be easily installed to replace any thermocouple or filled-system bulb, in a well of ¼" diameter or more and of any depth or any material.

This unusual adaptability is permitted because heat transfer to the sensitive portion of the bulb is through its tip, instead of through the sidewalls. The bulb is therefore easily brought into actual contact with the well by pushing the bulb against the end of the well. It is suitable for any temperature measurement or control in ranges below 600° F.

• QB717 A neoprene-covered, flexible-shielding *metallic electrical conduit* has been developed by the Flexpansion Div. of the Techniflex Corp. It features a neoprene coating applied to give natural bond of rubber to metal. Conduit and couplings alike are liquid-proof, air-tight and chemical resistant. Depending on conditions of service, the new flexible

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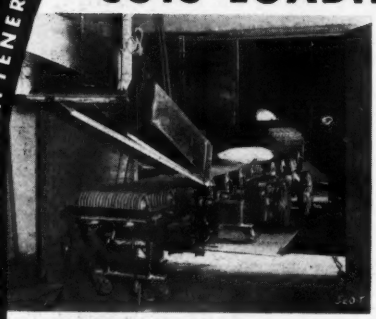
THE FLEXOVEYOR CAR LOADER

CUTS LOADING COSTS



The Flexoveyor Box-car Loader puts an end to hand-trucking and carrying. The car loader takes your product from a Flexoveyor or other floor conveyor across the loading dock and "around the corner" to either end of the box car. It is flexible and adjustable to height at both ends. 1500 bags per hour capacity.

FLEXIBLE—Discharge end turns 90° either way.
PORTABLE—Can be used anywhere in the plant.
REVERSIBLE—Can be used for loading or unloading.
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POWELL VALVES start their 103rd year of service to Industry

—and the Powell record of satisfactory performance throughout all the past years is your guarantee for the future.

A century is a long time to concentrate on making valves—and nothing but valves. But it's not only important *how long* you've been doing something but also *how well.*

The fact that, in all these years, Powell has never failed to produce the *right* valves to satisfy every industrial need, is real "service."

As we start our 103rd year, there's a Powell Valve of correct design *and material* for every one of your flow control requirements. And, as new conditions bring new demands, there'll be Powell Valves to meet them.

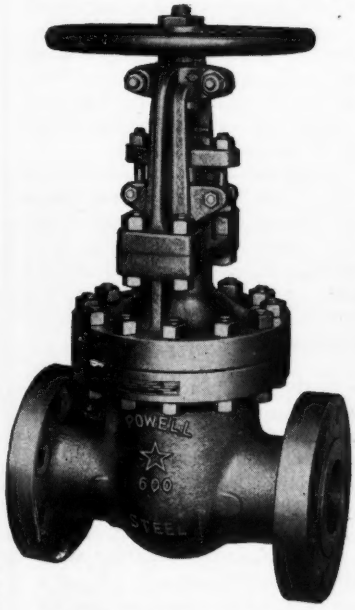

Fig. 6003—Class 600-pound Cast Steel Gate Valve with flanged ends, outside screw rising stem, bolted flanged yoke and tapered solid wedge.

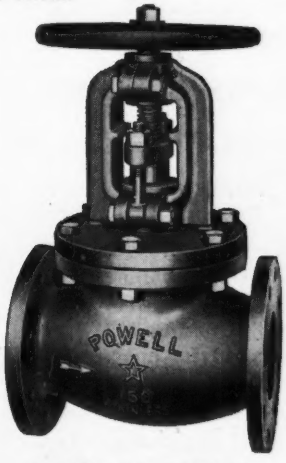

Fig. 2429—150-pound Stainless Steel Globe Valve with flanged ends, bolted flanged yoke and outside screw rising stem.

Fig. 1708 — 200-pound Bronze Globe Valve with screwed ends, union bonnet, renewable specially heat treated stainless steel seat and regrindable, renewable wear-resisting "Powellium" nickel-bronze disc.

Fig. 2051—Stainless Steel "Y" Valve with flanged ends, bolted flanged yoke-bonnet and outside screw rising stem.

Fig. 1793—Large 125-pound Iron Body Bronze Mounted Gate Valve. Made in sizes 2" to 30", inclusive. Has outside screw rising stem, bolted flanged yoke and taper wedge solid disc. Also available in All Iron for process lines.

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Cincinnati 22, Ohio
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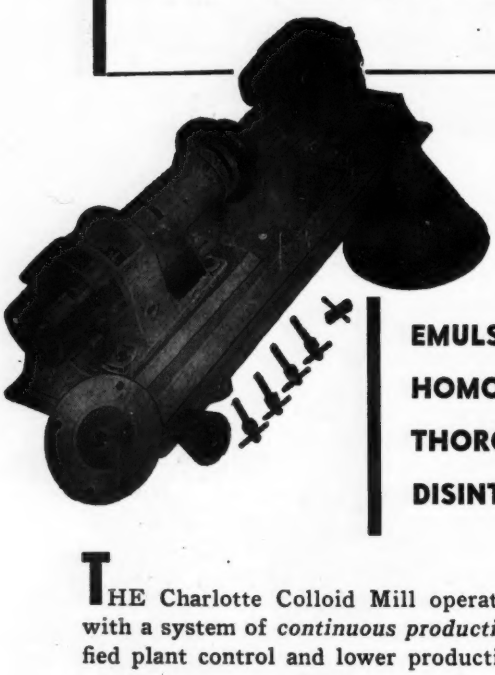
GET CONTINUOUS PRODUCTION

and lower production cost



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DISINTEGRATING

THE Charlotte Colloid Mill operates at high speed and with a system of *continuous production* to give you simplified plant control and lower production cost.

A patented groove design of the rotor and stator enables the Charlotte to operate with not only a hydraulic shear but also a mechanical shear. Great flexibility is assured by Fingertip Microfine Adjustment, rapid cleansing and fast change-over.

You can save floor space, produce a uniform product and cut costs by using the Charlotte Colloid Mill for experiments, research and high-speed dispersion and homogenization of liquids, solids in liquids, and pastes. Available in units of 1 to 75 H.P. and with capacities from 10 to 5000 gallons per hour—for Paint, Food, Pharmaceutical, Insecticide, Rubber, Synthetic Detergent and many other industries. Send today for Catalog C-12.

CHARLOTTE COLLOID MILL

G. M. T. COLLOID MILL CORP.
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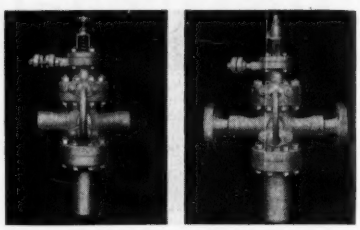
Exclusive Manufacturer and Distributor

● Manufacturer's Representatives in Principal Cities

electrical conduit is expected to have an operating efficiency life of from ten to fifteen years.

• QB718 A new type of *high pressure reducing valve* employing the long proved internal pilot piston operated construction is available from Leslie Co.

The new valve, known as Class HS,



is designed for steam, air or gas service. It handles inlet steam pressures from 300 to 1500 psi and air or gas inlet pressures from 300 to 3000 psi. Reduced pressure range is from 100 psi to 600 psi. Maximum inlet temperature is 1000° F. It is available in sizes 1", 1¼", 1½" and 2" with Series 90 or 150 flanges or welding ends.

No change of spring or diaphragm is needed from minimum to maximum reduced pressure setting. Valve is single seated, closing with the inlet pressure for positive dead-end shut off. Valve action is very fast with instant corrective reaction to any flow change.

Interchangeability of replacement parts make a complete overhaul possible without removal of the main body from the pipe line. Controlling valve is solid stellite. Cylinder liner and piston are made of hardened stainless steel, highly ground finish. Valve has a monel diaphragm.

• QB719 The "Packaged" *generator* line of Electric Machinery Mfg. Co. is now extended to include self-contained main generator switch on ratings up to 15 kw. No additional switches or controls necessary. Unit is connected direct to load. The line features units in single and 3 phase ratings up to 150 kw at speeds 900 rpm to 1800 rpm.

• QB720 A *pump bucket attachment* for the Lewis-Shepard "Standrive" power fork trucks reduces time and effort in handling loose and hard-to-manage materials. The load is dumped by releasing latch. When empty, the bucket returns itself to locked upright position only upon being completely lowered.

• QB721 American - LaFrance - Foamite Corp. is producing a complete new line of 2½ gallon resistance welded silicon bronze *fire extinguishers* to replace riveted and copper fabricated units of the same capacity. They are soda-acid; foam; plain water; and anti-freeze water types. Although lighter in weight by 4½ pounds,

the manufacturer claims greater strength.

Additional features include resistance welded seams; welded hemispherical domes,, top and bottom; silver soldered elbow pads; projection welded hanger loop; new wider bottom handle; interchangeable caps, collars and gaskets; new spot welded name plates with identifying colors for each type unit; transparent plastic nozzle providing clear vision of passageway and greater resistance to accidental blows which could close passage of ordinary lead nozzles.

• QB722 Cor-In *corrosion inhibitor zinc rods,* produced by Rotometals, Inc., are fitted with standard pipe-plug ends for ready insertion into heat exchangers, piping and other hydraulic equipment. The zinc rods come in ⅜", ½", ⅝", ¾" and 1" diameters, with lengths up to 12 inches and provide galvanic protection against corrosion.

• QB723 The new Bantam *demineralizer* of the Barnstead Still & Sterilizer Co. more than doubles the capacity of earlier models. It is a renewable cartridge unit, and contains both cation and anion resins of improved effectiveness. Each cartridge now has capacity to remove nearly 1200 grains of ionizable salts from raw water, more than twice the former capacity. Flow rate is 5 to 8 gallons per hour.

• QB724 Penn Industrial Instrument Corp. is producing a new line of gas-filled *temperature recorders and recording pressure gages.* These recorders are available with 1, 2, 3, or 4 pens and provide for easy field installation of the actuating system and pen mechanism if, for example, a 1-pen recorder is to be made into a 2, 3, or 4 pen instrument. Temperature tube systems feature an all stainless steel, Heli-arc welded construction with an improved design of spiral spring A standard bulb design is arranged so that it can be converted in the field into any of the usual apparatus connections: union flange or hub with bendable extension, union flange or hub with rigid extension, union with separable socket with or without extension neck, adjustable connection with split flange.

• QB725 The Anders Co. has just introduced a line of fully automatic *compressed air dryers.*

These units are being manufactured in 9 standard models with capacities from 15 cfm to 750 cfm (stp) based on conditions of 100 lbs pressure and 70° F. Operating pressures can be from 30 to 150 lbs or 40° to 120° F. inlet temperatures and final exit dew points as low as —60° F.

All models can be furnished for either electric or steam operation. Electrical units are of either open or explosion-

Check

this list of WIGGINS GASHOLDER engineering and operating advantages when you think of storing chemical process gases, such as

CO_2, CO, H_2, N, CH_4

✓ Takes advantage of the strong, flexible, impervious qualities developed in synthetic rubber fabrics by the chemical and process industries.

✓ Has an absolutely dry frictionless seal.

✓ Is unaffected by heat, cold, ice, snow, wind or rain—even earthquakes.

✓ Delivers gas exactly as received, dry, pure, undiluted.

✓ Has less than ½ of 1% dead space for quick purging.

✓ Will give years of continuous performance without mechanical servicing.

These all add up to the fact that only with a Wiggins Gasholder can you store chemical process gases with

NO OPERATING COST
PRACTICALLY NO MAINTENANCE

A General American engineer will be glad to give you further details.

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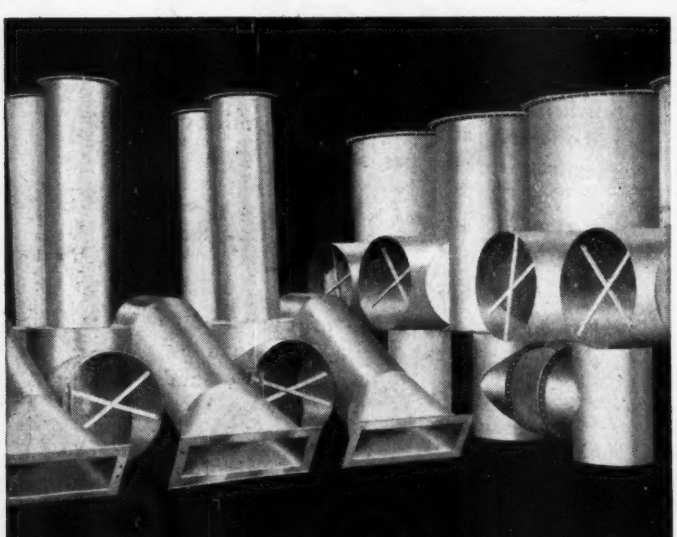
WIGGINS VAPOR SEALS GENERAL AMERICAN TRADE MARK

LOWER UPKEEP . . . FEWER REPAIRS

WITH

Stainless Steel



WHEN THE CHIPS ARE DOWN, fabrication of *Stainless Steel* is a job for experts. Illustrated above are *Stainless Steel* ducts used to draw off gases under intense heat conditions. Coupled with the ordinarily destructive powers of gas fumes and smoke, only *Stainless Steel* can take it without peril to the product.

Textile, chemical, pulp and other basic manufacturing industries find that *Stainless Steel* fabrication from huge reflux towers to small machine parts means lower upkeep and fewer repairs and rejections.

Truitt's engineering service in the fabrication of *carbon and Stainless Steel* is available to industry. Should your need be tanks, vats, or other equipment, remember . . . Truitt, *one of the South's larger fabricators* . . . will gladly figure your job without cost or obligation.

TRUITT

MANUFACTURING COMPANY

• GREENSBORO, NORTH CAROLINA •

Fabricators of Solid Stainless Steel and Stainless-Clad Tanks • Dyeing Vats • Washing Tanks • Steam Drums • Storage Tanks for Acids and Alkalis • Mechanical Agitators • Separators • Stainless Steel Trucks • And Many Other Stainless Steel Products.

proof construction. Steam and electric units allow ready conversion from steam to electric and electric to steam.

LABORATORY EQUIPMENT

Nefluoro-Photometer LE108

Nephelometric, fluorometric, and colorimetric analyses can be made in a single instrument.

A new instrument for nephelometric, fluorometric and colorimetric analyses has been developed by Fisher Scientific Co. and Eimer & Amend. Called the Nefluoro-Photometer, it provides rapid

and accurate analyses in all three fields with quick interchange from one to another. The same controls are used for all analyses.

The Nefluoro-Photometer is a line-operated, electronic instrument which measures quantitatively, light transmitted (or absorbed), light reflected, or light emitted by a sample in solution or suspension.

Fundamentally, the new Nefluoro-Photometer is a "null" (zero balancing) instrument. The meter employed is a built-in galvanometer. Only four controls need be used. Incandescent, mercury and sodium light sources are available, all operating on 115 volt 50-60 cycle A.C., as does the instrument itself.

The incandescent light source emits light in the visible range—from about 400 to 750 millimicrons. Selection of a proper filter affords the selection of bands in this range for colorimetric work.

A mercury arc source affords ultra-violet light, the principle emission being in the near ultra-violet range. This source is used primarily in fluorometric work.

The sodium light source has its principle emission at 340 and 590 millimicrons, and finds use where a sharp peak at either of these wavelengths is desired.

The optical cell compartment accommo-

Norblo

Dust and Fume Collection Systems

Shown above are the automatic bag type, the hydraulic (washer) and the centrifugal (cyclone) types included in Norblo equipment. Most heavy duty large scale Norblo installations in the mining, smelting and chemical fields include two types in combination. Norblo engineers have wide experience in designing and fabricating highly efficient dust and fume collection systems in all of the industries in which dust and fume collection is of major production or good housekeeping importance. Write for bulletins — or tell us the general nature of your problem.

THE NORTHERN BLOWER COMPANY

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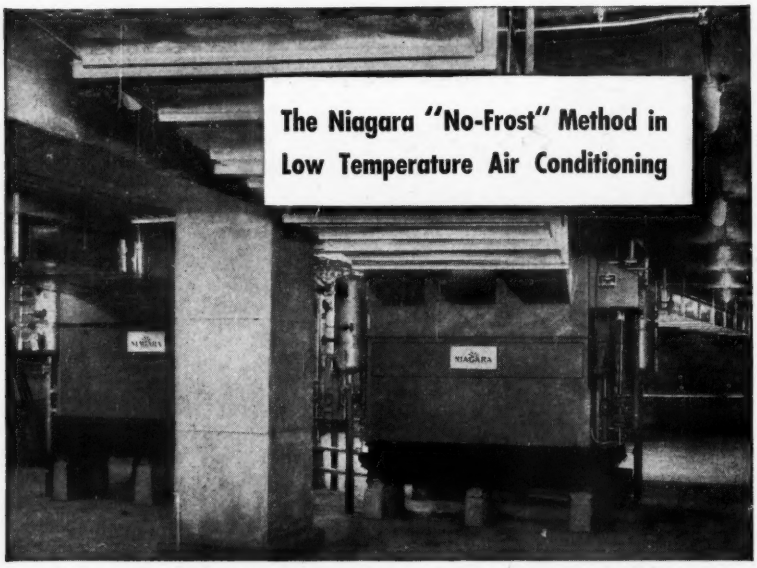
Making or Holding Products Uniform



High Precision Industrial Air Conditioning with extremely dry atmospheres (or with high relative humidities) at low temperatures.

● Specializing for thirty years in the more difficult problems of air conditioning for industrial processes, this Company has developed a group of units that make it easier and less expensive for you to get the particular air conditioning benefits you may need for your special process, or to overcome some obstacle of climate or condition that is interrupting your production or causing loss from rejected parts or materials.

The Niagara "No-Frost" Method, for example, has been used to create temperatures as low as -90°F. in cold test rooms, and to provide air with only 1 gr. of moisture per lb. for special processing.

The Niagara Type "A" Air Conditioner creates any condition of temperature and humidity for a test or process, and if wanted, creates different conditions in different rooms simultaneously.

Some of the industrial applications of these units: internal combustion engines, motors and air craft, super-chargers and carburetors, gas cooling and controlled atmosphere process, film, plastics, fiber, rubber and adhesives control, biological processing such as penicillin, and yeast.

Write for a Niagara Blower Bulletin on a subject which interests you, or for the address of the nearest Niagara Field Engineer.

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Over 35 Years of Service in Industrial Air Engineering

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INDUSTRIAL COOLING HEATING • DRYING

NIAGARA

HUMIDIFYING • AIR ENGINEERING EQUIPMENT

dates the different types of cells necessary and shuts out all light except that from the proper light source.

All optical cells are cylindrical. 1" cells are plain and used in all three types of analyses. ¾" cells are of three types. One is a plain cylindrical cell, one is a mirror cell and the third is partially black fritted to prevent reflections. The mirror cells are for use in the analysis of weekly fluorescent materials.

For turbidity measurements, the black fritted cells insure that light from a cell is due only to true scattering of the suspended material and not light reflected from the cell walls.

● LE109 A new low cost *"Saf-T-Bag"* for the safe handling and storage of glass containers is available from Benson & Associates. Made in standard sizes to fit glass bottles from one quart up to five gallons, it can also be designed to fit any size or shape glass containers.

The "Saf-T-Bag" is made of an outer jacket either neoprene coated fabric, flameproof duck or plain duck material; with or without removable shock absorbing side and bottom padding; draw-cord to draw up snug around neck of bottle; rigid bottom discs and strong carrying handles.

● LE110 Tracerlab, Inc. is now producing a new improved *radiation survey meter.* This newest version of the ionization chamber SU-1A portable radiation survey meter is a 3" meter, calibrated directly in milliroentgens per hour. Three score ranges of 25, 250 and 2500 milliroentgens per hour permit precise readings to be made from well below tolerance dosage rate to values far above those normally encountered in most radioactivity laboratories. The batteries need be renewed only after approximately 1000 hours of operation. A moveable circular shield permits differentiation between beta and gamma radiation. The SU-1A Meter can monitor not only radioisotopes but also X-rays of energies as low as 50 kilovolts.

● LE111 The Filt-R-Stil cartridge *demineralizer* of the Ion Exchange Products Dept. of American Cyanamid Co. has been re-designed. The conductivity indicator on the new wall model now shows the quality of treated water continuously. Previously, it had been necessary to depress a button and check the conductivity at varying intervals.

● LE112 Three improvements have recently been made in the Gilmont *ultra-microburet* of The Emil Greiner Co. It now features a special swivel attachment to the micrometer which facilitates operation; a crank handle that increases speed of titration; and also an improved stand and attachments to simplify adjustments in titration.

...ANOTHER BECKMAN
ADVANCEMENT IN SPECTROPHOTOMETRY

Accurate—Convenient—Versatile...and Low Priced

Note simplicity of controls. Also note the sloping panel that permits easy readability of scales from both sitting and standing positions.

ADVANCED FEATURES DESIGNED INTO THE MODEL "B" INCLUDE...

CONVENIENCE:

Direct reading wavelength scale...320 to 1000 millimicrons...readings reproducible to great accuracy.

Direct reading transmission and absorbance (optical density) scales on large easily-read meter.

Continuously variable slits for smooth, precise settings.

4-Position sensitivity multiplier permits readings to be made on most advantageous portion of scale.

Four position cell carriage permits quick positioning of any of 4 cells by an external control.

ACCURACY:

Photometric accuracy to 0.5% transmission or 1% absorbance.

Negligible stray light—stray light effects completely eliminated between 360 and 1000 millimicrons...less than 1½% even at 320 millimicrons.

Resolution—permits less than 5 millimicron band width over most of spectral range.

VERSATILITY:

Liquid, solid and gaseous samples may be analyzed.

Monochromatic light beam is easily brought outside the instrument for long path measurements and special uses.

Accommodates large cells up to 50 m. m. path length in standard cell carrier.

Interchangeable photocells—red or blue-sensitive to utilize the high resolving power of the Model "B".

Easily-attached Model "B" accessories will be available for special types of measurements and for added convenience and accuracy. Write for details.

The new Model "B" Spectrophotometer is by far the outstanding routine instrument available. It provides advancements pioneered in the Beckman Quartz and Infrared Spectrophotometers but never before offered in a low priced instrument. These advantages are important because they combine simplicity, convenience and versatility without sacrificing accuracy and reliability.

The Model "B" has better ultraviolet performance... better resolution... better wavelength and photometric accuracy... and more freedom from stray light than any other instrument in its field.

A descriptive bulletin on the Beckman Model "B" Spectrophotometer will gladly be sent on request. Write today. *Beckman Instruments, National Technical Laboratories, South Pasadena 11, California.*

BECKMAN **INSTRUMENTS CONTROL MODERN INDUSTRIES**

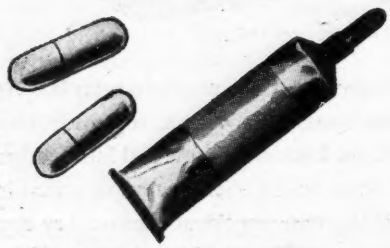
pH Meters and Electrodes—Spectrophotometers—Radiation Meters—Special Analytical Instruments

Inhaled Injected Instilled

For *versatility* in dosage form, ephedrines may well be leading the list. You will help *your own ephedrine product* to maintain leadership in the field by basing your manufacturing processes on *Merck uniformly pure Ephedrines.*

This outstandingly favored group of Merck products includes one that will best fit the dosage form you are marketing:

IS YOUR PREPARATION DESIGNED FOR ORAL OR FOR TOPICAL USE?



Is it compressed into tablets or dissolved in water or oil?

Whatever form of dosage,

MERCK EPHEDRINES SUPPLY THE ANSWER TO YOUR PRODUCTION PROBLEM

EPHEDRINE ALKALOID ANHYDROUS MERCK U.S.P.
white, fused crystalline mass
forms oily solutions that stay clear

EPHEDRINE ALKALOID HYDROUS MERCK U.S.P.
white, granular crystals
contains not more than ½ mol. H_2O

EPHEDRINE HYDROCHLORIDE MERCK U.S.P.
small, white, odorless crystals
aqueous solutions are practically neutral

EPHEDRINE SULFATE MERCK U.S.P. CRYSTALS
fine, white, odorless crystals

EPHEDRINE SULFATE MERCK U.S.P. POWDER
fine, white, odorless powder

(All ephedrines are affected by light; Merck well-sealed, amber-colored containers are designed for full protection)

Please write for full information and quotations

MERCK EPHEDRINES

MERCK & CO., Inc. *Manufacturing Chemists* RAHWAY, N. J.

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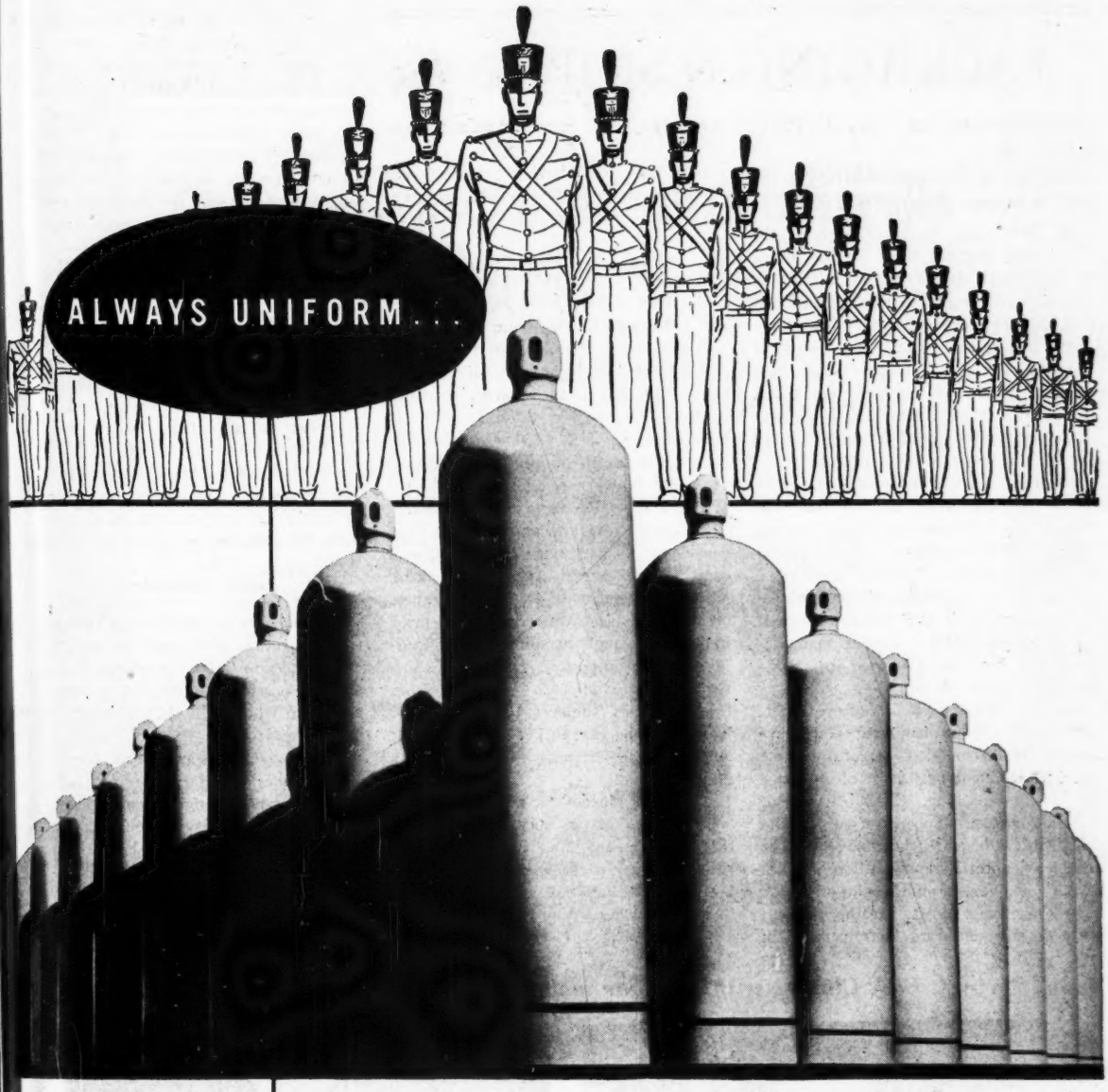

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Every Hackney Seamless Cylinder is uniform in thickness and strength . . . a uniformity made possible by the Hackney Cold Drawing Process. Each cylinder is comparatively light in weight . . . yet rugged in construction. However, uniformity in Hackney Cylinders is not confined to physical characteristics alone. Look to performance records as well. There, you will see how Hackney Cylinders are alike in the utmost protection they provide your product . . . in their ability to deliver low transportation costs . . . in the long life each one provides. *For full details write us.*

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CONTAINERS FOR GASES, LIQUIDS AND SOLIDS

PACKAGING & SHIPPING

by T. PAT CALLAHAN

Shipper's Responsibility For Claims Reduction

At the Tenth Annual Forum of the Packaging Institute held in the Commodore Hotel, New York, last fall, W. B. Lincoln, Jr., technical manager of the Inland Container Corp., made some remarks in a speech entitled "The Shipper's Responsibility for Damage Claims Prevention" which had much of value to all in industry, whether their job is directly concerned with shipping or not. Following is a condensation of some of his talk:

At least four groups—shippers, container manufacturers, carriers and receivers—are responsible for damage claims. Here emphasis will be placed upon the shipper's share in creation of claims since he is, broadly, also responsible for the quality of the packing material he accepts from his container manufacturer, and the type of service he permits the railroads to sell him.

Carriers feel that unprecedented postwar demands upon them have brought increased transportation hazards which could be overcome by the use of improved and stronger packing. They believe that it is the duty of shippers to use packing that will withstand what may now be considered normal transportation hazards. This is an over-simplified solution which may prove very costly to the shipper, without commensurate improvement in claims. To avoid having to accept such requirements, many shippers must improve their methods.

Shippers and Claims

Shipping surveys prove that the shipper can aid materially in claims prevention. A test program covering over a million containers showed that 1% of the containers shipped were reported damaged to some extent. Of those resulting in claims, 39.5% of the dollar value of the claims was due to shipper faults; 43% of the dollar value, carrier faults; and 17.5% of the dollar value, unassigned causes.

Principal causes of damage which were considered primarily under the shipper's control were excessive slack in the load, poor arrangement of cargo, inadequate bracing, poor preparation of the car prior to loading, rough handling during loading. Other important causes to which the shipper contributed resulted from the failure of shippers to reject dirty, leaky cars and cars in bad condition with nails or other hazards in the walls or floors, etc.

No sound business is going to permit conditions to get in such a sorry state that the company goes in the red as a result of poor packing and car loading, but why be half-way in the approach to this problem? Why not do a bang-up job?

If we are convinced of the soundness of doing a bang-up job we must recognize that control of packaging and packing specifications and practices is an engineering function that spreads clear across the entire organization.

During engineering of the product, its design, strength, accuracy of construction, appearance, physical condition as regards whether it is finished or rough, knocked down or set up, all have a bearing on how it should be packed and loaded, on loss and damage claims and the net cost of delivery.

Efficiency of the packing operation, cost of materials and labor used, warehousing and material handling problems created, space requirements and the like all have an important bearing on the production department's operations. In many plants, poor planning for packing and failure to design containers properly or select the proper type of container, make the packing operation a bottle neck.

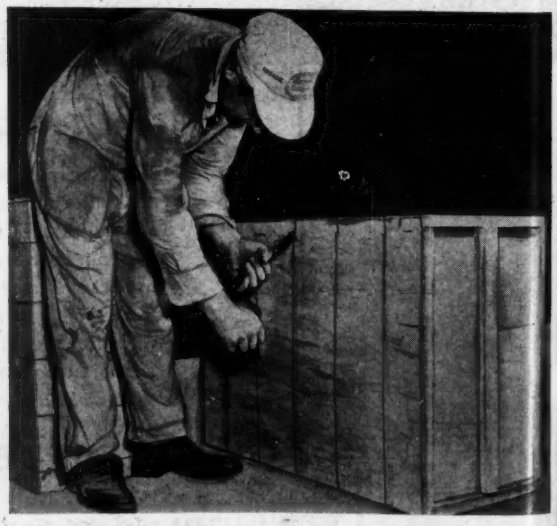
Sales Advantage

Safe delivery of merchandise in factory fresh condition is a necessary part of a sales program. The appearance of the product, possible multiple use of the containers in which it is delivered, advertising values of the printed message on containers are all aspects of the merchandising values which can be incorporated in a proper packaging program.

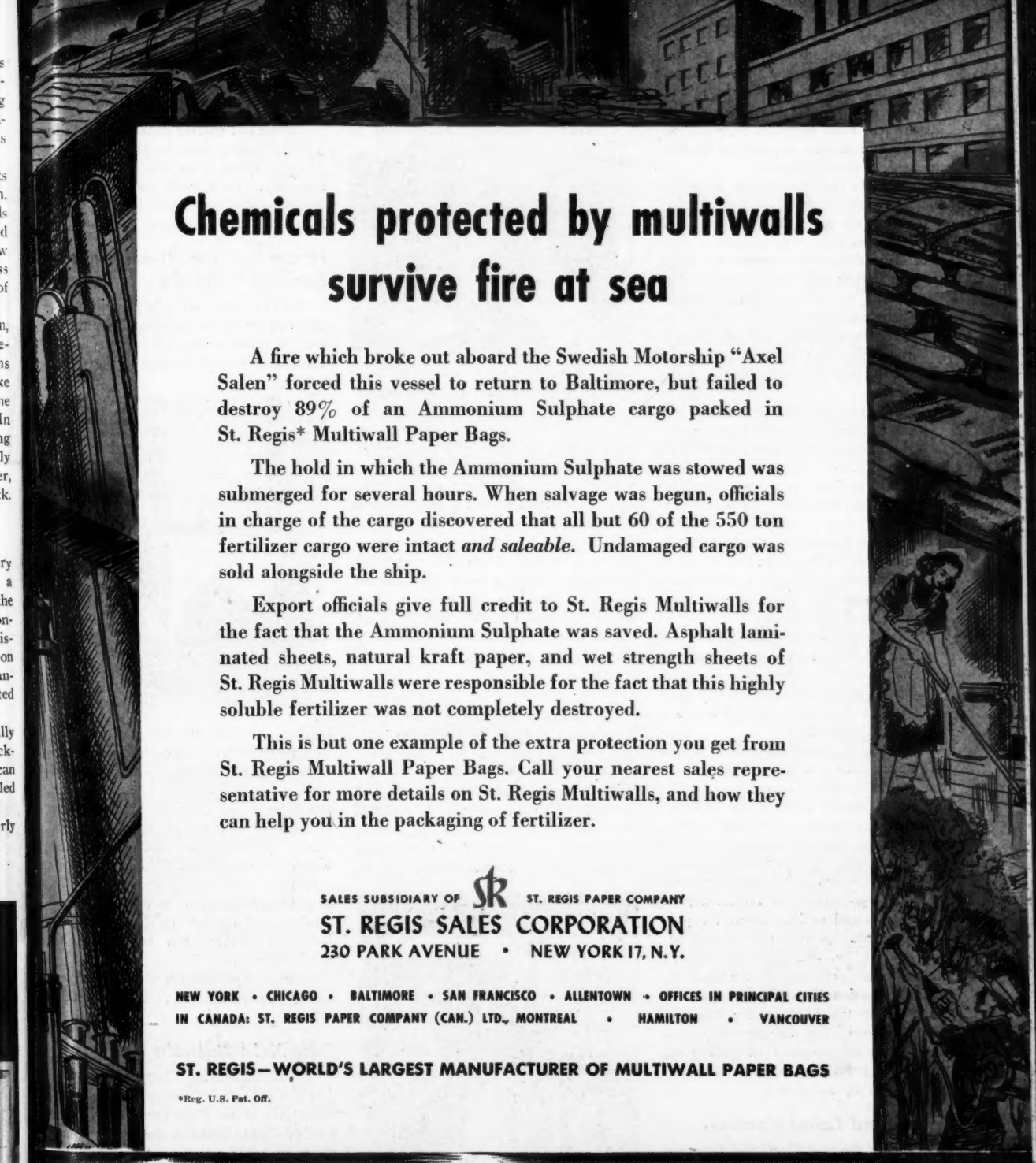
The financial division should be vitally concerned with this matter because packaging and packing are costly. They can be made much more costly if not handled properly.

The packing function must be properly

Space Savings, Easy Closure with Wirebound Boxes



Economy of space in storing wirebound boxes, and the securely closed shock-absorbent containers they form account for their wide use. The number stacked (left) contrasts sharply with the few containers of another type in similar space to the right. A twist of the wrist with a special twisting tool (right) makes a secure closure for domestic or export shipment.



Chemicals protected by multiwalls survive fire at sea

A fire which broke out aboard the Swedish Motorship "Axel Salen" forced this vessel to return to Baltimore, but failed to destroy 89% of an Ammonium Sulphate cargo packed in St. Regis* Multiwall Paper Bags.

The hold in which the Ammonium Sulphate was stowed was submerged for several hours. When salvage was begun, officials in charge of the cargo discovered that all but 60 of the 550 ton fertilizer cargo were intact *and saleable.* Undamaged cargo was sold alongside the ship.

Export officials give full credit to St. Regis Multiwalls for the fact that the Ammonium Sulphate was saved. Asphalt laminated sheets, natural kraft paper, and wet strength sheets of St. Regis Multiwalls were responsible for the fact that this highly soluble fertilizer was not completely destroyed.

This is but one example of the extra protection you get from St. Regis Multiwall Paper Bags. Call your nearest sales representative for more details on St. Regis Multiwalls, and how they can help you in the packaging of fertilizer.

SALES SUBSIDIARY OF SR ST. REGIS PAPER COMPANY

ST. REGIS SALES CORPORATION

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NEW YORK • CHICAGO • BALTIMORE • SAN FRANCISCO • ALLENTOWN • OFFICES IN PRINCIPAL CITIES
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ST. REGIS—WORLD'S LARGEST MANUFACTURER OF MULTIWALL PAPER BAGS

*Reg. U.S. Pat. Off.

ST. REGIS PACKAGING SYSTEMS

organized. Responsibility must be definitely assigned. Whether the job requires only a few minutes a month or the full time of a large staff, the individual or department must be given necessary authority and support, as well as training, to achieve proper results.

To make a real contribution to damage claims reduction, the shipper

1. Must set up packing as a major function.
2. Must design his product so it can be packed and shipped safely. This means he must have real cooperation between engineering or product development groups and the packing function.
3. Must pack to conform to carrier rules.
4. Must pack so that the product will carry safely, recognizing the peculiar hazards of his product and distribution scheme.
5. Must purchase containers from responsible, technically competent suppliers.
6. Must use sound practices in handling and warehousing packed merchandise.
7. Must load containers properly into cars which have been carefully prepared to carry them.
8. Must recognize that multiple hazards are generally found when severe loss and damage is encountered. Usually, contributory negligence of the shipper is at the bottom of such multiple hazard conditions.

It has become the accepted thing to say, "The man charged with the packing function must sell top management on the importance of proper packing and loading." Such a statement leaves one cold. To be sure, top management must depend upon its specialists to bring forward technical information so prepared and presented that they can appreciate the importance of the problem and desirability of the proposed program. But the subsequent action should be one of management's "buying" the program on the basis of sound realization of its value to the company rather than having the program "sold" to them. Top management should "buy" a sound program of packaging, packing and loading to make a major reduction in damage claims.

New Hand Label Gummer

Models of the new King Label Gummer incorporate an exclusive feature that the manufacturer, King Sales and Engineering Co., San Francisco, Cal., claims will cut cleanup time by as much as 90%. A key-in-groove drive shaft connection permits the operator to lift the small, compact machine out of the glue-pot and roller section for easy cleaning by rinsing in water. No tools are required for the operation.

Another feature of the new machine is its lightness and consequent portability which allows one labelling machine to do the work of several more bulky ones. It is particularly adapted to the stop-and-go type of manufacturing set-up, the manufacturer states, in that it can be

moved along with the goods to be labeled throughout the manufacturing operation. The unit plugs into any light socket.

Controls consist of a single on-off switch, and the only adjustment necessary is to govern amount of glue to be applied. This adjustment can be made in a few seconds while the machine is in operation.

Roller speed is 90 feet per minute. Thirty to seventy labels per minute can be applied, depending on operator and size of label. The manufacturer states that adhesive is applied evenly, without lumps, excess, or spots on any form of paper or thin, flexible material in any size, shape or length.

Models are available to take labels and sheets up to sixteen inches in width, for all over or marginal gumming.

New Pallet Racks

A new type portable rack for stacking palletized materials is offered in standard and heavy duty models by Equipment Manufacturing Co., Inc., Detroit, Mich.

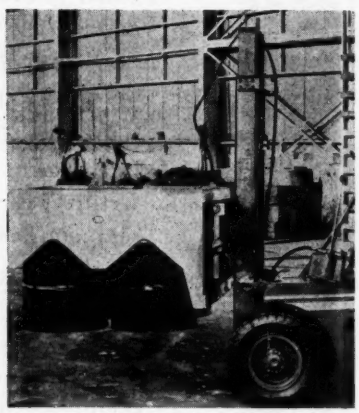
This rack is designed to accelerate

order-picking and case handling by permitting the tiering of pallet loads to ceiling heights without tying up low-level goods.

Anyone can quickly install the racks by merely spotting them in place with fork trucks. There is no welding or cutting necessary. Rack levels can be raised to accommodate high loads by the use of removable extension posts.

Drum Carrier Attachment For Fork Trucks

The Tray-Hart Multiple Drum Carrier, designed to pick up, carry and tier two or four 55-gallon drums without the use of a pallet, is now listed among the special



handling attachments for use on Clark fork trucks. The device fits over the top of drums, lifts and moves them without need for a pallet. The clamping shoes which grip the drums are actuated by hydraulic power taken from the fork trucks hydraulic lift mechanism. The weight of the drums tightens the grip.

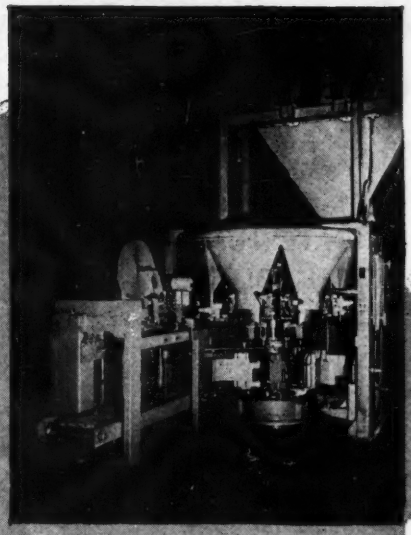
Manual handling of drums is almost entirely eliminated by use of the drum carrier; and damage to drums and injuries to workers can be reduced to negligibility.

Further information is obtainable from Clark Equipment Co., Battle Creek, Mich.

New MCA Bulletin

The Manufacturing Chemists' Association has published Chemical Safety Data Sheet SD-28 on Phosphoric Anhydride, the 28th in the series of chemical product safety manuals prepared by them, and the fourth one on phosphorus and its compounds, the other three being SD-16, Phosphorus Elemental, SD-26, Phosphorous Oxychloride, and SD-27, Phosphorus Trichloride. Designed for supervisory staffs and mangements, the manuals concisely present essential information for the safe handling and use of chemical products.

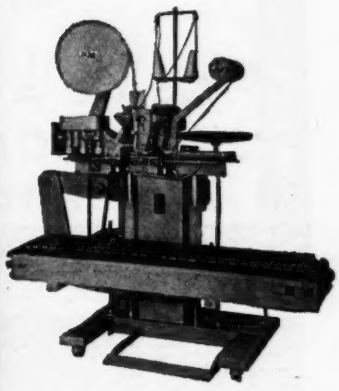
The new manual may be obtained at 20 cents per copy from the MCA, 264 Woodward Building, Washington 5, D. C.



MODEL "A" —Completely automatic—extremely accurate weighing. Saves on "give away" material, labor and bag costs, thus paying for itself quickly. Machine capable of filling and closing 100-lb. bags at the rate of 15 per minute . . . needs one operator.

Bagpak

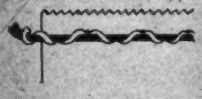
Sets the pace for Packaging!



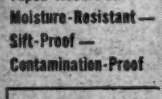
BAGPAKER® machines and methods provide low-cost packaging . . . speedy, modern packaging. The **BAGPAKER** operation gives you this unbeatable combination: tough **BAGPAK®** open-mouth multi-wall paper bags *plus* a "cushion-stitch" closure that's really contamination-proof, sift-proof and moisture-resistant.

A **BAGPAK** engineer will gladly show you how a **BAGPAKER** paves the way to lower packaging costs . . . better weighing, closing and handling. Write us; he'll call at your plant.

ALL BAGPAKERS MAKE THIS FAMOUS "CUSHION STITCH"



Taped closure is Moisture-Resistant— Sift-Proof— Contamination-Proof



MODEL "DA" (Portable and built to last)—One operator, filling and closing, can handle 2 to 4 100-lb. bags a minute . . . 6 to 12 a minute where filled bags are delivered to **BAGPAKER** conveyor (quickly adjustable for various bag sizes). Starting and stopping of sewing operation is automatic . . . no tape wasted.

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220 East 42nd St., New York 17, N. Y.

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IRON REDUCED BY HYDROGEN N. F.

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CALCIUM ACETATE, PURIFIED
COPPER ACETATE SOLUTION
COPPER NITRATE TECHNICAL
COPPER NITRATE C. P.
COPPER NITRATE SOLUTION
CUPROUS CHLORIDE
POTASH CHROME ALUM, GRANULAR

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Plant: Glen Riddle, Pa.

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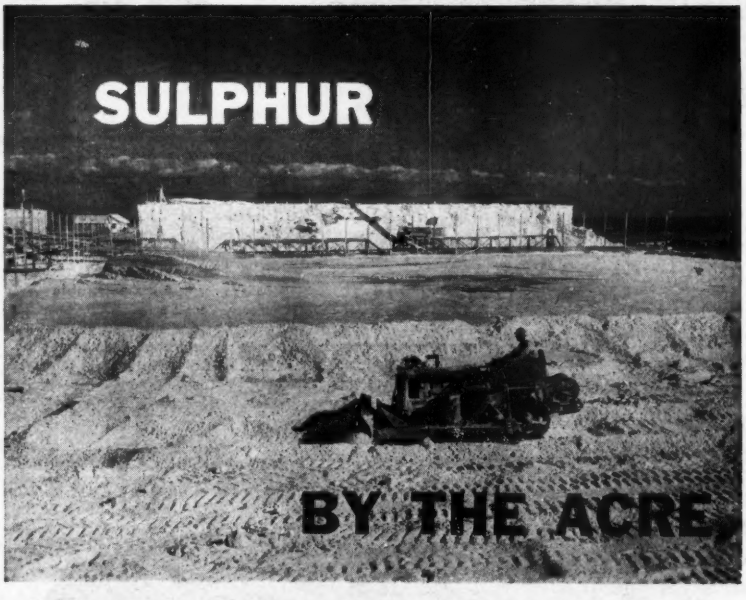

Sulphur mined from its Gulf Coast deposit will be stored in this vat of Freeport Sulphur Company at its Grande Ecaille property in Louisiana. Sulphur storage blocks of solid yellow stone often rise as high as 50 feet and stretch over as much as 5 acres.

FREEPORT SULPHUR COMPANY

OFFICES: 122 East 42nd Street, New York 17, N. Y.

MINES: Port Sulphur, Louisiana • Freeport, Texas

SULPHUR SERVES INDUSTRY

CARBON BLACK

(Continued from page 43)

furnace and channel blacks now on the market have been clarified by a classification according to particle size, surface properties, and degree of structure (Table II).

Structure is a loosely defined term describing the grouping of the small, nearly spherical carbon particles into rigid configurations. This grouping can be seen by the electron microscope. Furnace blacks, especially those made from oils, exhibit a much wider range of apparent structural arrangement than channel blacks. Numerical values cannot be assigned to structure differences, but structure differences may be classified from measurements of carbon black properties such as oil adsorption, comparative viscosity of black and vehicle, and the black's resistance to compression. Furthermore, differences in black properties which give rise to this term are distinctly shown by the physical properties of rubber-black compounds.

Surface properties are defined by the degree of oxidation or concentration of carbon-oxygen complexes present on the surface of the black. The pH properties of carbon blacks are related to the concentration of these surface oxides. Surface oxide concentration on channel black is nearly four times that commonly found on furnace black. This difference is in amount only; qualitative data show the surface oxide or volatile matter to be similar in nature. Hydrogen is present in about equal quantities in both furnace and channel black.

There is a wide range of particle size in both channel and furnace blacks, the latter ranging somewhat wider. Particle-size distribution in a single type of carbon black is real, but the extent to which size distribution may be applied in interpreting the behavior of blacks is subject to much question. It is difficult to obtain a representative dispersion suitable for size count; in any case all values should be cross-checked.

QUALITY NEEDS FOR RUBBER

Since furnace blacks have wide variations in rubber-reinforcing properties, the furnace black process may lend itself readily to the development of a superior carbon black and completely replace the channel black process. Already many more qualities of furnace black have been developed in the past seven years than will ever be utilized. On the other hand, new quality development in the channel black industry has practically ceased. It is conceivable that tires will eventually be made to give double the present road wear now obtained by those made with channel black, particularly if compounding research is continued to find the most effective way of utilizing new types of furnace carbon black and new rubbers.

Do these doodles mean debits for you?

These doodles represent light, air, insects, and moisture—four natural phenomena that too often cause unnatural losses for a packer.

But you'll never find these doodles on the debit page of packers who put their products in *light-proof, air-proof, insect-proof, moisture-proof* metal containers.

AMERICAN CAN COMPANY

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This trademark CANCO *is your assurance of quality containers. Look for it!*

Other advantages of the can

1. Cans are break-proof.
2. Cans protect contents against light, air, insects, and moisture.
3. Cans are *light*—mean lower shipping costs. *Compact*—mean more storage and display space.
4. Cans mean eye-appeal for impulse buying.
5. Cans are tamper-proof.
6. Cans are easy to open and close.

PLANT OPERATIONS NOTEBOOK

Beryllium Poisoning

According to the National Safety Council, there is increasing evidence that many beryllium compounds are toxic. Although confirming data on experimental animals is lacking, cases in human beings are being reported in increasing numbers for industries using beryllium and its compounds.

Dermatitis, conjunctivitis, and pneumonitis have been reported. The types of lung involvement are: one, acute, results from relatively short exposures to high concentrations of the oxide, fluoride, sulphate, etc.; the other, which has been called delayed chemical pneumonitis, results from longer exposure and is chronic.

Very small amounts of beryllium are used in most industrial applications. Chronic phases have developed from exposure to beryllium phosphors and beryllium oxides while acute phases have been observed in the producer plants where the fluoride, oxide, sulphate, and metal are present. No cases have been reported from machining or grinding the common copper-beryllium alloy.

Research work on this problem is being actively pursued.

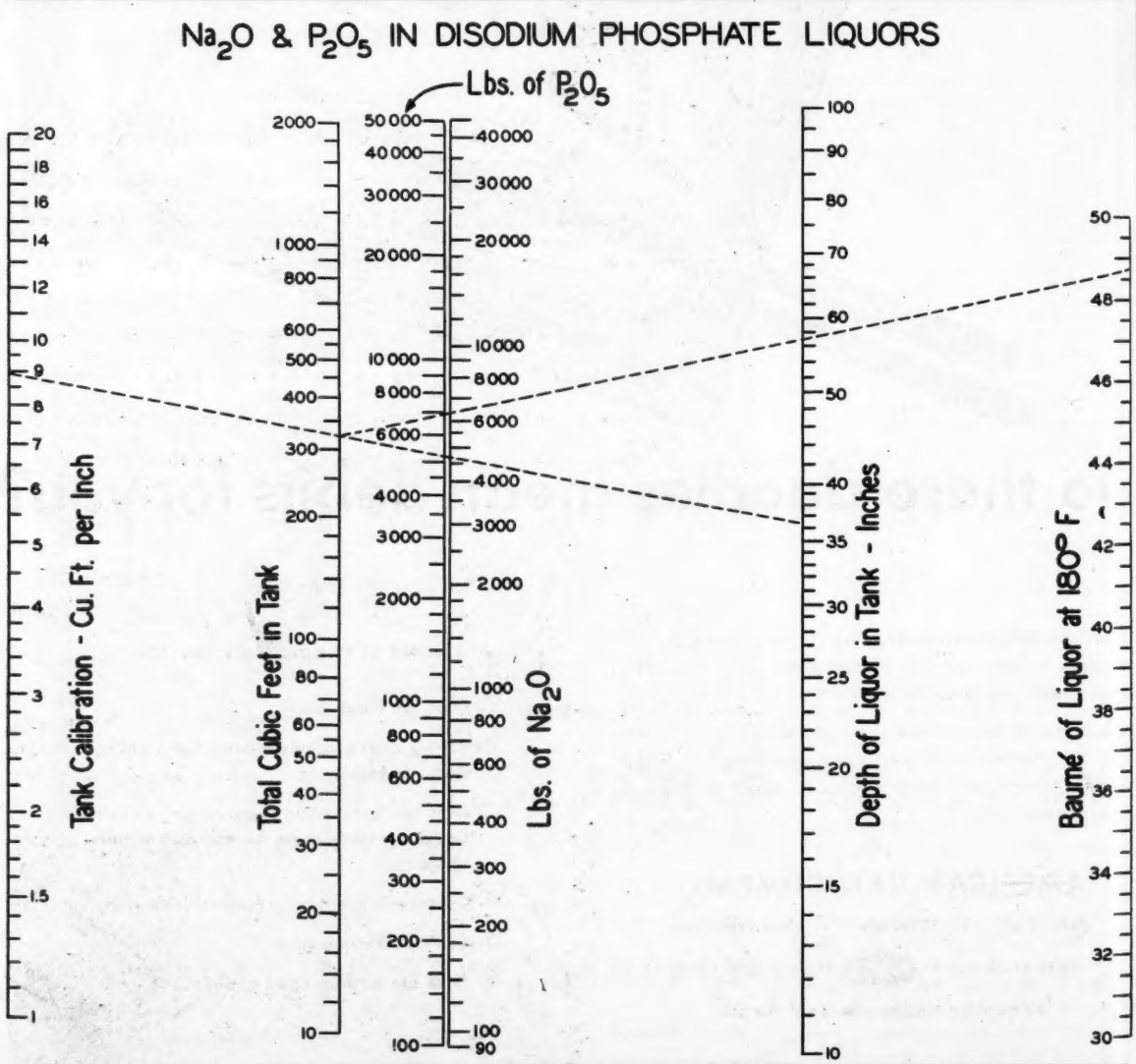
NOMOGRAPH-OF-THE-MONTH Edited by DALE S. DAVIS

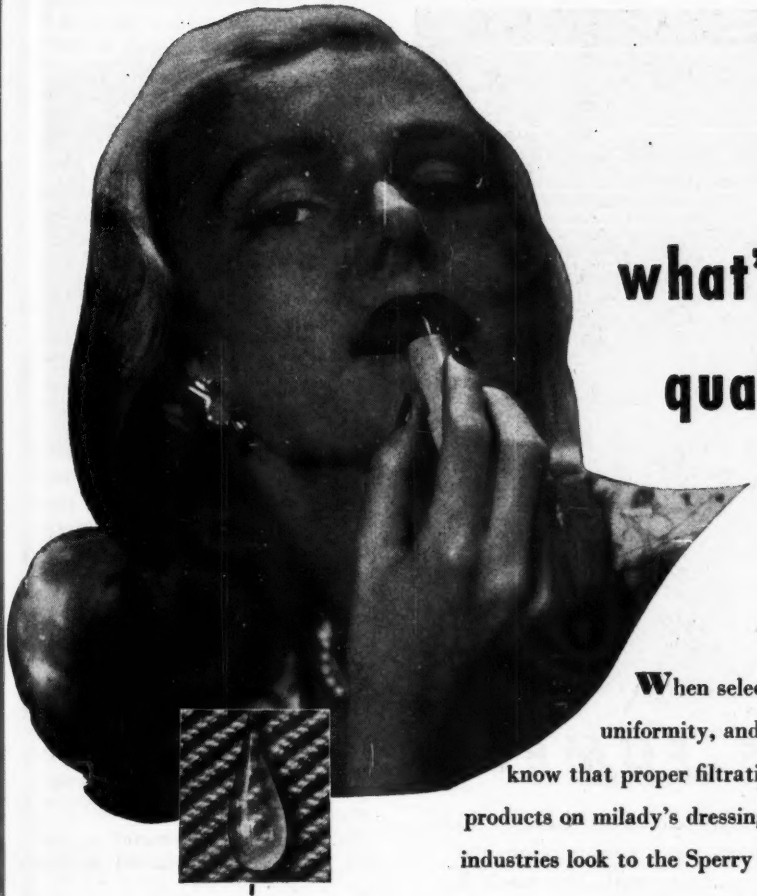
Readers are invited to submit for publication in this department any original nomographs pertaining to chemistry or engineering. **$10** *will be paid for each one used.*

Na_2O and P_2O_5 in Na_2HPO_4 Liquor

by V. L. MARQUART
Curtis Publishing Company
Philadelphia, Pennsylvania

THE accompanying nomograph was developed as a means of estimating the contents of Na_2O and P_2O_5 in strong disodium phosphate liquors that result from sodiation of phosphoric acid. It is applicable to all disodium phosphate liquors of reasonable purity. All that is


Na2O & P2O5 IN DISODIUM PHOSPHATE LIQUORS
Lbs. of P2O5
Tank Calibration - Cu. Ft. per Inch
Total Cubic Feet in Tank
Lbs. of Na2O
Depth of Liquor in Tank - Inches
Baumé of Liquor at 180° F



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The Plate Filter Press offers many advantages over all other types. It's economical . . . low first cost, low labor and maintenance costs. It's efficient . . . produces maximum clarity and the driest cake, performs low, medium, and high pressure filtration. Just a few of the reasons why it's the most widely used filter today.

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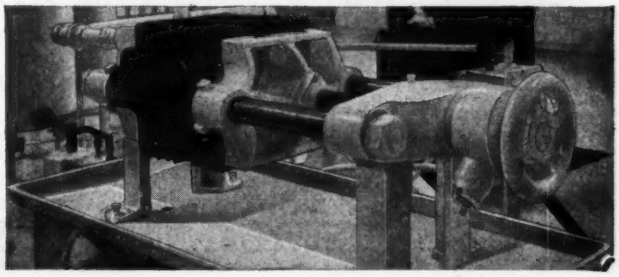
SPERRY FILTER PRESSES



required is a knowledge of the calibration of the liquor tank, depth of liquor in the tank, and gravity of the liquor at 180° F. The nomograph gives the weight in pounds of sodium oxide and phosphorus pentoxide present in the liquor when these three variables are known.

It is customary to maintain strong disodium phosphate liquors at approximately 180° F. If the actual temperature departs appreciably from this value, a correction of 0.035° Bé/°F. may be applied, provided that the actual temperature is within the range of 150° to 210° F. (Add correction for temperatures above 180° F., and subtract corrections for temperatures below this value.) Since the base equations were developed for measurements at 180° F., any change in actual temperature from this standard value will produce an error on the nomographic results. Within the range noted, however, the error will always be less than two per cent, which is well within the accuracy of the physical measurements taken.

The following relationships were experimentally determined for disodium phosphate liquor:

$$s = 10^{(0.0128\,B + 0.693)}$$

$$p = 10^{(0.0121\,B + 0.770)}$$

Where:

s = % Na_2O

p = % P_2O_5

B = °Bé at 180° F.

The nomograph, constructed by geometric methods,[1] is predicated on three basic equations:

$$c = xy$$

$$S = \frac{9048\ cs}{14500 - 100\ B}$$

$$P = \frac{9048\ cp}{14500 - 100\ B}$$

Where:

c = volume of liquor in tank, cu. ft.

x = tank calibration, cu. ft./in.

y = depth of liquor in tank, inches

s = Weight of Na_2O, pounds

p = Weight of P_2O_5, pounds

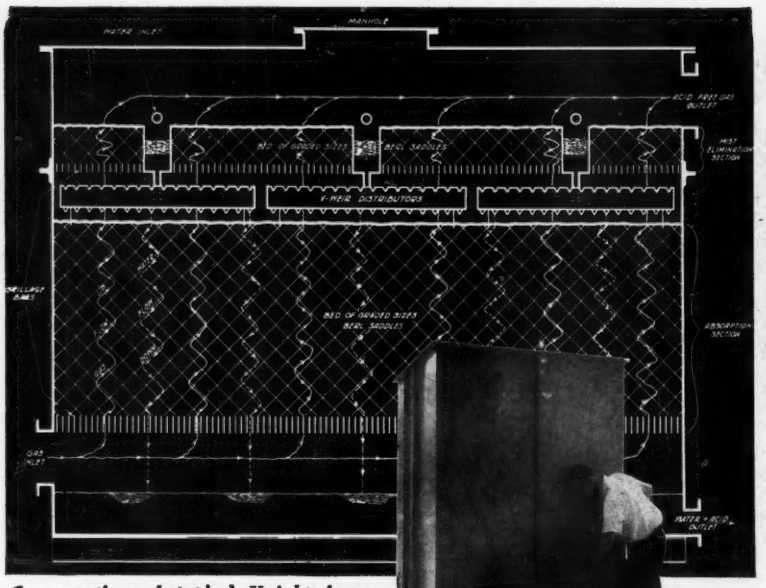
The use of the chart is illustrated as follows: How much disodium phosphate liquor is contained in a tank when the liquor is 36.3 inches deep and when 8.9 cubic feet correspond to one inch of depth? What is the content of Na_2O and P_2O_5 in this quantity of liquor if the Baumé value is 48.4 at 190° F.? Connect 8.9 on the tank calibration scale with 36.3 on the scale for depth of liquor and read the volume of the disodium phosphate liquor as 323 cubic feet. Correct the Baumé reading by the expression,

$$48.4 + 0.035(190 - 180) = 48.75$$

Connect 323 on the volume scale with 48.75 on the Baumé scale and read the weights of Na_2O and P_2O_5 as 6280 and 6950 pounds, respectively.

Literature Cited

[1] Davis, D. S., "Empirical Equations and Nomography," Chap. V, New York, McGraw-Hill Book Co., 1943.



Cross section of typical Knight fume washer.

Eliminate CORROSIVE FUMES!

In designing Fume Washers Knight engineers consider individual space and weight limitations, water consumption and fan power, as well as service conditions involved. The result is an engineered functional unit "tailored" to meet your specific requirements. Of Pyroflex or Permanite Construction (depending on service) for complete corrosion resistance, these units utilize Berl Saddles to insure peak performance. Although individually engineered for maximum efficiency, Knight fume washers are relatively low in cost and economical in operation. Some of the jobs handled by these complete functional units include:

Permanite-constructed unit for handling hydrochloric acid fumes.

Removal of HCL fumes
Removal of chlorine fumes
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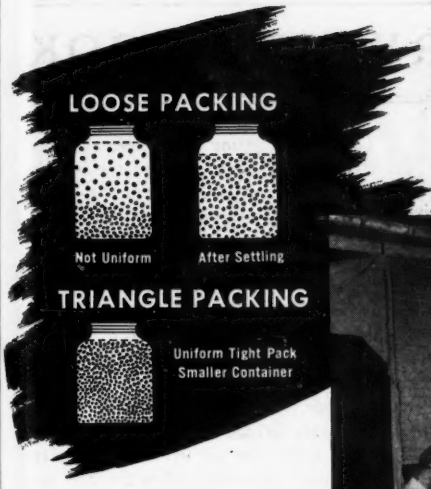
Removal of dust from exhaust gas
Production of dilute muriatic acid
Cooling hot acid gases for processing
Suppression of oil and acid mists
Cooling and removing dust from gases and many other types of service.

When writing for information please include full details regarding service conditions.

Maurice A. Knight 201 Kelly Ave., Akron 6, Ohio
Acid and Alkali-proof Chemical Equipment

Powdered Materials PACKED TIGHTER



WITH THE TRIANGLE MODEL U-1 AUGER PACKER

If your powdered materials are packed loosely they'll settle after handling... and there's no sales appeal in a package that doesn't appear full! The answer is the Triangle Model U-1 Auger Packer:

1. It packs uniformly and tightly, enabling you to use a smaller, less expensive container.
2. Gives greater consumer acceptance to your product because it's a fully packed package.

Simple... easy to operate... accurate... labor saving... this machine now available for *"immediate delivery."* Take the first step to better packaging by writing today for a bulletin which gives complete details.

- √ Fills and packs automatically after container is placed in position.
- √ 20 to 30 per min. in cans, bags, cartons, jars and envelopes.
- √ 1 oz. to 5 lbs. filled with extreme accuracy.
- √ Reduces operator fatigue while increasing production. (No foot pedals.)
- √ Easy to clean.
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FAIRMOUNT CHEMICALS

- **HYDRAZINE BASE 93-95%**
- **HYDRAZINE HYDRATE 85% 100%**
- **HYDRAZINE SULFATE** Commercial and C.P.

  Use: Manufacture of intermediates for dyes and pharmaceuticals. Hydrazine Base has solvent properties similar to liquid ammonia.
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  Use: Isolation of ketones and aldehydes, forming well-defined crystalline compounds.
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  Use: The stabilized salts are used in light-sensitive diazo-type coatings.

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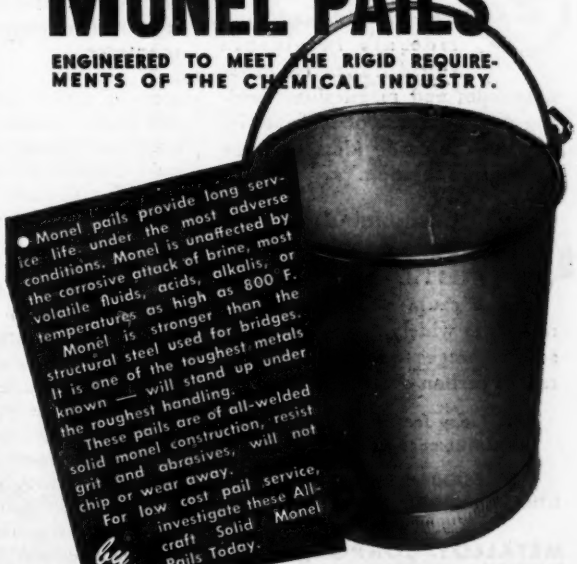
TOUGH, CORROSION RESISTANT

MONEL PAILS

ENGINEERED TO MEET THE RIGID REQUIREMENTS OF THE CHEMICAL INDUSTRY.



• Monel pails provide long service life under the most adverse conditions. Monel is unaffected by the corrosive attack of brine, most volatile fluids, acids, alkalis, or temperatures as high as 800 F. Monel is stronger than the structural steel used for bridges. It is one of the toughest metals known — will stand up under the roughest handling.

These pails are of all-welded solid monel construction, resist grit and abrasives, will not chip or wear away.

For low cost pail service, investigate these All-craft Solid Monel Pails Today.

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The remarkable moisture-absorbing character of the Chloride and Bromide of LITHIUM makes them very valuable for control of moisture. Food dehydrators, foundry cupolas and steel blast furnaces use the Chloride in atmospheric control. LITHIUM Chloride is ordinarily used as a 40% brine, while LITHIUM Bromide brine can be concentrated to 65% without crystallizing. Properly adjusted to alkalinity, it is effective without a corrosion inhibitor.

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The Chloride and Fluoride are invaluable ingredients in most aluminum and magnesium welding fluxes because of their ability to take the oxide films of these metals into solution.

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LITHIUM Chloride, because of its non-toxic nature, is widely used in carbonated beverages to retard the escape rate of carbon dioxide.

Write today for complete data on LITHIUM compounds. No obligation.

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Division LITHIUM CORPORATION OF AMERICA, INC.

LABORATORY NOTEBOOK

Radio-Frequency Mass Spectrometer

Study of the formation of negative atomic ions of the heavier metallic elements led to the development, by Dr. Willard H. Bennett of the National Bureau of Standards, of a means for detecting, separating, identifying, and measuring such ions. Since negative atomic ions, consisting of atoms with extra electrons, have very low energies of formation, their study has been difficult because of the rapid dissociation of the ions in very short distances of travel. The difficulty has now been met by a special vacuum tube which provides a simplified and flexible radio-frequency mass spectrometer. This spectrometer not only

Dr. Willard H. Bennett of the Bureau of Standards adjusts the new radio frequency mass spectrometer.

opens up a new means of exploring the little-known fundamentals of negative atomic ions but its special characteristics make it applicable for the mass spectrometry of positive ions.

Negative atomic ions have been detected for only a few elements, although theory has indicated the possibility of producing such ions from many elements. Experiments begun by Dr. Bennett in 1946 indicated that negative atomic ions might exist in the many forms of electrical discharge in vacuum tubes, but remain undetected if the distance between the discharge and the electrode was large.

In its more advanced form, the two-stage spectrometer may be used for positive ions as well as negative ions. The equipment consists of a multigrid tube in which an adjustable radio frequency is applied to two grids with all other electrodes held at the proper direct-current potentials. The ion current is measured at the plate. The more exacting requirements of negative-ion separation require the addition of a small magnetic field produced with coils. It was necessary, therefore, to devise an experimental method for separating and identifying such ions within distances of a few centimeters. This was accomplished through the new mass spectrometer tube.

The first successful radio-frequency mass spectrometer, a single-stage six-electrode tube, consists of a cathode about which are arranged four co-axial cylindrical grids and an ion-collecting plate. Helmholtz coils surrounding the tube provide a 100-gauss magnetic field in a direction parallel with the axis of the tube. Such a field is required in negative-ion work to confine the electrons to the space inside the first grid and to avoid the formation of positive ions in parts of the tube where neutralization of the negative ions may occur before they reach the detecting electrode.

The simplicity and low cost of the radio-frequency mass spectrometer should make it attractive not only in those applications in which its special characteristics make it superior to any other kind of mass spectrometer, but also in those laboratories where the expense of other types of equipment makes their use prohibitive.

"One-Time" Solvent Use

The "one-time" user of solvents is among the more frequent victims of solvent accidents, case reports indicate. Apparently the cause is unfamiliarity with the possible hazards, particularly vapor poisoning, and the necessary precautions.

To eliminate all possibility of solvent illness, workmen should be prevented from inhaling solvent vapors even during the single job requiring not more than an hour or two. If the work cannot be moved outdoors or to an area where the vapors will be removed by suitable mechanical ventilation, gas masks or supplied-air respirators approved by the U. S. Bureau of Mines should be worn by the men. The solvent should be used from closed containers and solvent-saturated rags should be dried outdoors or where the vapors can do no harm.

If any of the workers develops symptoms such as dizziness, stomach upset, nausea, or a feeling of weakness, he should be removed from the job immediately and sent to a physician with information about the kind of solvent he was using. Some individuals, particularly those who are addicted to alcohol, are especially susceptible to solvent illness.

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Available in Greater Volume

Through expanding production facilities of the **CHEMCEL** plant, at Bishop, Texas, Celanese is making available increased quantities of organic chemicals vital to industry.

Formaldehyde, one of the most important products in the growing family of Celanese* Organic Chemicals, is now offered in greater volume. This high quality, U.S.P. chemical is sold commercially as Formalin, a water white solution containing 40% formaldehyde by volume, 37% by weight. It is obtainable in both methanol inhibited and uninhibited grades.

A clear, colorless liquid, Celanese Formaldehyde is widely used in resins, adhesives and plastics, and in the production of various organic chemicals.

A brochure is available containing specifications and general information on many of the Celanese organic chemicals. Write for your copy—and call Celanese whenever you need technical assistance regarding organics.

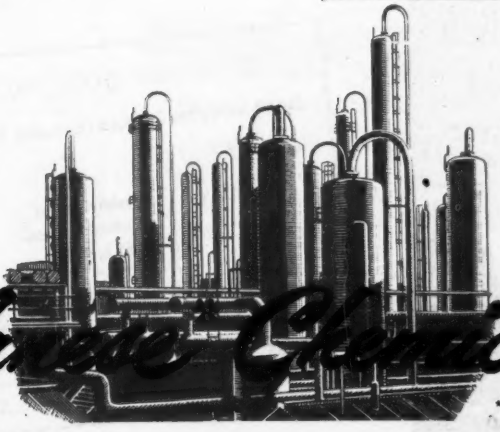
CELANESE CORPORATION OF AMERICA
Chemical Division
180 Madison Avenue, New York 16, N. Y.

CELANESE* ORGANIC CHEMICALS NOW IN PRODUCTION:

Formaldehyde	n-Propyl Alcohol
Acetaldehyde	Butyl Alcohols
Acetic Acid	Methylal
Methanol	Special Solvents
Acetone	Tricresyl Phosphates

FOR LABORATORY EVALUATION, SCHEDULED FOR FUTURE PRODUCTION:

2-Methyl-1, 3-Pentanediol
Propionaldehyde



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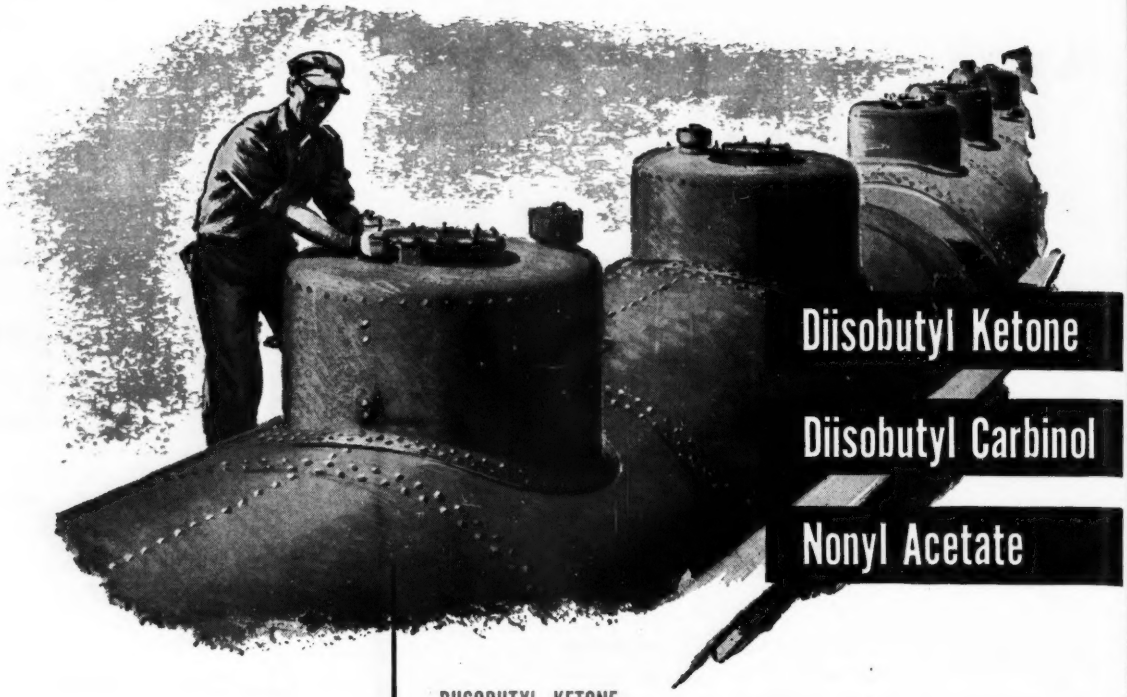

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Analytical Text

QUANTITATIVE ANALYSIS, *by W. C. Pierce and E. L. Haenisch.* John Wiley & Sons, Inc., New York, 3rd ed., 1948; 520 pp., $3.75. Reviewed by Sydney Ross, associate professor of chemistry, Rensselaer Polytechnic Institute.

THE NEW edition of this text makes it one of the most comprehensive books in quantitative analysis for student use. It deserves a high place for its inclusion of many features that are of direct assistance to a beginning student.

A carefully written appendix of mathematical operations, for example, supplies the very wants that send many students back to their freshman and high-school texts, frequently in vain. Here the specific questions that are asked by the sophomore are answered. For the first time, perhaps, the student begins to realize how to apply some of the apparently functionless mathematics he learned earlier. The same painstaking thoroughness in meeting student needs is shown throughout. The book contains more than the usual amount of theoretical development. Considering that alone, it could well be used as an introduction to physical chemistry for sophomores.

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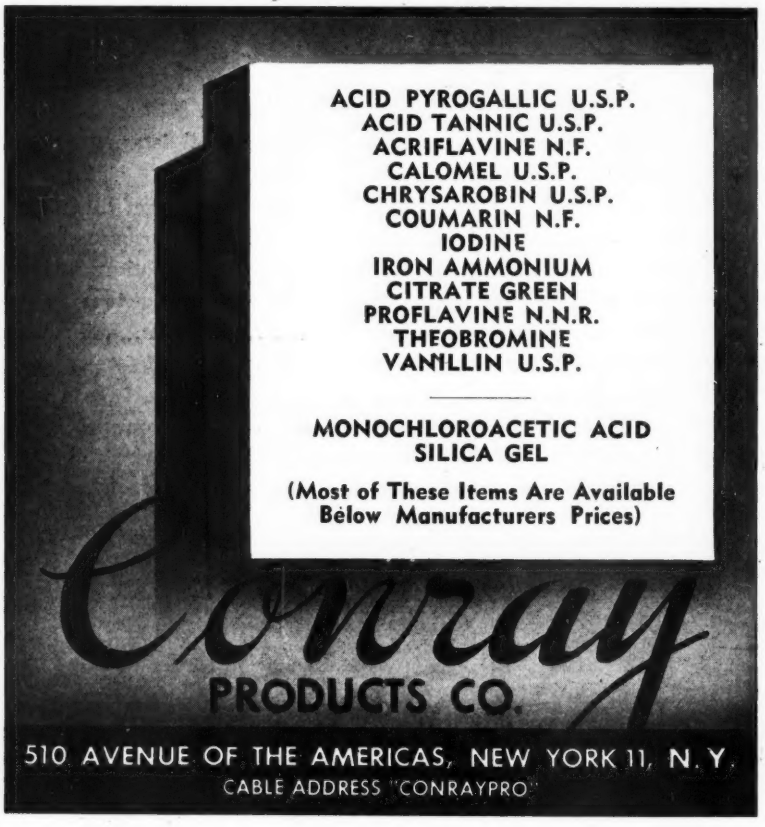
The practical aspects of laboratory work are demonstrated in an exemplary manner, and intended for a raw beginner in the laboratory. Very little is left to chance. Everything that can be supplied short of experience is to be found here. The book indeed goes very far in making a laboratory instructor unnecessary. It should therefore be a useful volume in the industrial analytical laboratory. The two Chapters on Methods, Operations and Apparatus, if well studied, would save the time and patience of many an industrial mentor. An intelligent high school graduate, fresh to the laboratory, could readily use these chapters with advantage. I know of no other place where the same material is so well and so fully presented.



Crystal Structures

CRYSTAL STRUCTURES (FIRST SECTION), *by Ralph W. G. Wyckoff.* Interscience Publishers, Inc., New York, 1948; $8.00. Reviewed by H. C. Kremers, Harshaw Chemical Co.

THE AUTHOR has attempted to bring together as briefly and concisely as possible all available data on crystal structures. The present volume is a complete revision of his former Supplement to "Structures of Crystals" published in 1934. Since the first supplement became out-of-date so rapidly, the author has published the present edition in loose-leaf form with indexing and paging set up separately for each chapter. This allows supplements and replacement sheets to be added from time to time.

To the casual user this sets up some confusion since the usual indexing plan cannot be followed. The loose leaf binder also tends to make the volume somewhat cumbersome. The publishers admit that it is an experiment.

The terminology used follows the general practice now set up in the description of crystal structures. The data presented are concise and as complete as limited space will allow. The volume is a valuable and ready reference in that most of the pertinent crystal data required on a compound or system is found at hand and sufficiently complete to meet most requirements. One ordinarily is required to refer to several reference sources to get anything like complete crystal data.

The volume can be recommended as an excellent and ready reference to assist those interested in the rapidly expanding science of crystal growing.

Organic Reactions

ORGANIC REACTIONS — VOL. IV, *Roger Adams, Editor-in-Chief.* John Wiley and Sons, Inc., New York, 1948; 428 pp., $6.00. Reviewed by Charles C. Price, University of Notre Dame.

THIS IS the fourth volume of a projected series containing detailed and critical discussion of various organic reactions, written by experts who have had laboratory experience with the reaction they describe.

The first two chapters of the present volume deal with the Diels-Alder reaction ("The Diels-Alder Reaction with Maleic Anhydride," by Milton C. Kloetzel and "The Diels-Alder Reaction: Ethylenic and Acetylenic Dienophiles," by H. L. Holmes). The next chapter ("The Preparation of Amines by Reductive Alkylation," by William S. Emerson) is followed by two more interrelated chapters ("The Acyloins" by S. M. McElvain and "The Synthesis of Benzoins" by Walter S. Ide and Johannes S. Buck). Chapter

(*Turn to page 120*)

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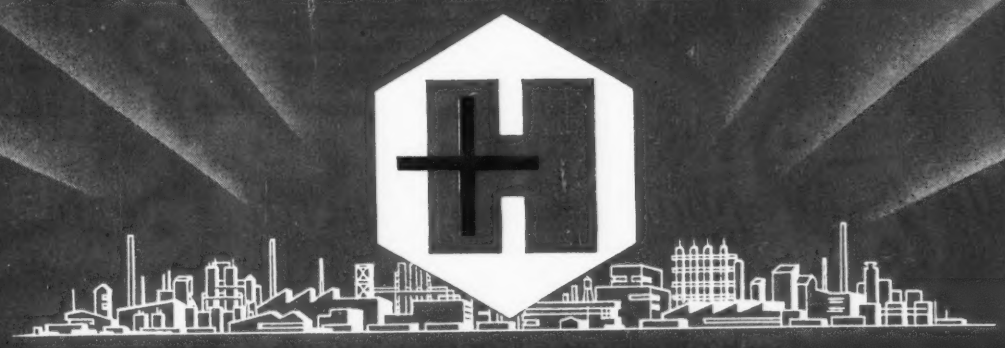

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(*Continued from page 116*)

6 describes the "Synthesis of Benzoquinones by Oxidation" (by James Cason), Chapter 7, "The Rosenmund Reduction of Acid Chlorides to Aldehydes" (by Erich Mosettig and Ralph Mozingo) and Chapter 8, "The Wolff-Kishner Reduction" (by David Todd).

As is to be expected for any book composed of independently prepared chapters, the style and presentation are far from uniform. Thus some of the authors seem to have presented a more thorough and critical survey than others. For example, the chapter by Dr. McElvain is especially brief (12 pages) and that by Dr. Holmes omits reference to a few interesting examples of the Diels-Alder reactions and the tables would have been somewhat more useful if the compounds listed had been arranged in a more systematic manner. The same comment might be made of the tables in Dr. Cason's chapter.

These are, however, but very minor factors; in general the book maintains the high quality standards set by the first three volumes, which certainly makes this series a "must" for the library shelf of all organic chemists.

The editors and publishers are to be complimented on a fine job of printing and binding. The many complex formulas and equations are very clearly presented and the tables are neatly arranged. Careful examination revealed only one insignificant typographical error.

Other Publications

THE HEXAGON is a new house organ published by the Finishes Division of Interchemical Corp., 57 State St., Newark 1, N. J., "to provide users of product finished with a better understanding of our organization, policies and products."

ADVANCE HEADLINES is a new house organ published by Advance Solvents & Chemical Corp., 245 Fifth Ave., New York, New York. It is directed to those in the protective coating industry.

LET'S LOOK IT UP is a new bulletin issued periodically by Reinhold Publishing Corp., 330 W. 42 St., New York 18, New York, to disseminate news about Reinhold books.

PIGMENTS FOR PAPER COATING is the seventh in a series of monographs of TAPPI. Obtainable from the Book Dept., Technical Association of the Pulp and Paper Industry, 122 E. 42 St., New York 17, New York, $5.00.

WOOL WAX, by D. T. C. Gillespie, presents a review of the properties, recovery and utilization of the material together with a bibliography of 422 literature references. Hobart Publishing Co., Inc., Box 4127, Washington 15, D. C., 96 pp., $5.00.

ZEITSCHRIFT FUR PHYSIKALISCHE CHEMIE for the years 1925 to date are now available on 35mm microfilm. Microfilm Service, 2153 Florida Ave., Washington 8, D. C.; 133 volumes (65,000 pp.), $665.00; single volume, $10.00; two or more consecutive volumes, $5.00 each.

THE TIMBER INDUSTRY IN GERMANY DURING THE PERIOD 1939-1945. BIOS Overall Report No. 3. British Information Services, 30 Rockefeller Plaza, New York 20, New York, 16 pp., $0.20.

NAVAL STORES REVIEW INTERNATIONAL YEARBOOK contains technical information, recent developments and statistics. H. I. Peace Publications, 620 Gravier St., New Orleans 12, La., single copies, $3.50; discount on quantities.

NUCLEAR CHARTS are available for instruction purposes. A series of six 25" x 36" charts, illustrating the important areas of nuclear physics, are available from Westinghouse Electric Corp., School Service, 306 Fourth Ave., Pittsburgh 30, Pa., $1.00.

THE PLASKON MAGAZINE is a new house organ distributed by the Plaskon Division of Libbey-Owens-Ford Glass Co., Toledo, Ohio.

STANDARDS OF HYDRAULIC INSTITUTE has been revised in an eighth edition. Hydraulic Institute, 90 West St., New York 6, New York, $3.00.

PUBLICATIONS OF THE NATIONAL BUREAU OF STANDARDS is a list of all Bureau publications from 1901 through June, 1947. Brief abstracts of papers published from 1942-June, 1947, are included. U. S. Government Printing Office, Washington 25, D. C. Circular 460, 375 pp., $0.75.

MEASUREMENT OF RADIOACTIVE ISOTOPES, published by the National Bureau of Standards, gives detailed directions for use of radioactive standard and calibrated samples of radio-isotopes. U. S. Government Printing Office, Washington 25, D. C. Circular 473, 12 pp., $0.05.

ECONOMIES IN SEASONING is Bulletin 23 of the Northeastern Wood Utilization Council, Inc., P. O. Box 1577, New Haven 6, Conn. The bulletin reprints a number of papers presented at a recent symposium on the subject, including one on chemical seasoning. It is obtainable from the Council at $2.00.

THEORETICAL STRUCTURAL METALLURGY, by A. H. Cottrell, Lecturer in Metallurgy at the University of Birmingham, discusses the impact of modern atomic theory and other physico-chemical concepts on the science of metallurgy. Longmans, Green and Co., Inc., New York, $5.25.

THE VANDERBILT 1948 RUBBER HANDBOOK supersedes the previous eighth edition. Because of recent advances in rubber technology, the book is more complete, especially with relation to compounding. Published by R. T. Vanderbilt Co., 230 Park Ave., New York, New York, $7.50. Free distribution to those directly concerned with rubber compounding.

ORGANIC CHEMISTRY, by Lynn, is written from the point of view of pharmacy and medicine. The third edition (1948) incorporates material necessitated by changes in the U. S. P. and the N. F. Lea and Febiger, Philadelphia, 355 pp., $5.00.

1948 A. S. T. M. STANDARDS ON PLASTICS is a greatly amplified fourth edition. A. S. T. M., 1916 Race St., Philadelphia 3, Pa., 610 pp., $4.50.

NEWER SYNTHETIC ANALGESICS brings together a group of papers resulting from a conference on newer synthetic analgesics sponsored by the New York Academy of Sciences. Available from the Academy, Central Park West at 79 St., New York 24, New York, 174 pp., $2.75.

MESON THEORY OF NUCLEAR FORCES, by Pauli, Second Edition. Interscience Publishers, Inc., New York, 69 pp., $2.00.

THE UNITED STATES AND FOREIGN INVESTMENT PROBLEMS, by Cleona Lewis. The Brookings Institution, Washington, D. C., 359 pp., $4.00.

LANGE'S HANDBOOK OF CHEMISTRY, a reference work familiar to all chemists, has been newly revised in a sixth edition. Handbook Publishers, Inc., Sandusky, Ohio., 2,082 pp., $7.00.

A SMALL CONTINUOUS WOOD DISTILLATION UNIT, Bulletin 24 of the Northeastern Wood Utilization Council, Inc., P. O. Box 1577, New Haven 6, Conn., 16 pp., $0.25.

BIBLIOGRAPHIC SURVEY OF CORROSION—1945. National Association of Corrosion Engineers, 905 Southern Standard Bldg., Houston 2, Texas; 129 pp.. $5.00 to non-members of the association.

DIRECTORY OF THE AMERICAN COORDINATING COMMITTEE ON CORROSION lists the names, addresses, and fields of special endeavor of many of the principal corrosion workers in the United States and Canada. National Association of Corrosion Engineers, 905 Southern Standard Bldg., Houston 2, Texas; 62 pp., $2.00.

BIBLIOGRAPHY ON INDUSTRIAL RADIOLOGY, 1945-1948, by Herbert R. Isenburger. This is a second supplement, bringing the original bibliography up to date. St. John X-Ray Laboratory, Califon, N. J., $2.00.

THE 1949 MODERN PACKAGE ENCYCLOPEDIA is a completely revised edition, over half of which is new material. Modern Packaging, 122 E. 42nd St., New York 17, New York; 950 pp., $6.50.

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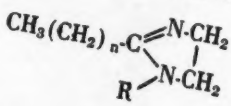

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Boiling point (1mm)	220°C	240°	250°
Surface tension 0.1% in 1%HCl	29.5	31.5	33

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NEWS OF THE MONTH

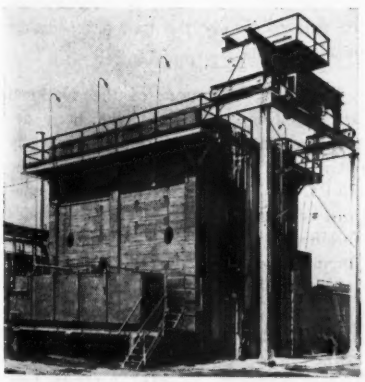
National Distillers Products Corp. will expand into the industrial chemical field by constructing a $10 million plant for manufacture of metallic sodium and chlorine. A wholly-owned subsidiary will construct and operate the new plant.

A contract with E. I. du Pont de Nemours & Co., Inc., will provide National Distillers with licenses for the scheduled processes and also technical assistance on the project. Du Pont and Ethyl Corp. are the only producers of sodium at present, but the latter uses its production in its own operations.

A new chemical plant for nylon intermediates is planned by E. I. du Pont de Nemours & Co. on a 1,700-acre site near Victoria, Tex. One tract of land has been purchased, and an option taken on another. Preliminary engineering studies of the site have been made and detailed work may begin early this year.

Synthetic iso-octyl alcohol ("Oxoated" Olefins, C.I., August, 1948, p. 211) is being produced commercially for the first time by an adaptation of the Oxo process at Esso Standard Oil Co.'s Baton Rouge, La. plant. The big interest now is in iso-octyl alcohol as a low-cost material for plasticizer production, but the flexibility of the process makes production of other chemicals a good possibility.

A selected gasoline fraction is reacted with hydrogen and carbon monoxide in the presence of a special catalyst at pressure up to 3,000 pounds per square inch. Although only a small high-pressure plant (see accompanying picture) has been converted for this operation, Esso Standard is considering conversion of a larger hydrdogenation plant later.



High pressure reactors in reinforced concrete stall produce first commercial iso-octyl alcohol by Oxo synthesis at Esso Standard Baton Rouge plant.

Reichhold Chemical Corp. will build an alkyd resin plant in Houston, Tex. The first unit, scheduled for completion about six months after the site has been purchased, will cost about $500,000. Over a two-year period, this original capacity will be doubled.

Hercules Powder Co.'s anhydrous ammonia unit to be located at its Hercules, Cal. plant is already in the drawing board stage, and the company engineering department is waiting to direct construction. This new capacity, expected to be available in 10 to 12 months, is in addition to other such production at the site. It will be used mainly by Hercules in its own operations.

McCarthy Chemical Co.'s new plant at Winnie, Tex. was recently dedicated. More than 500 guests attended. The plant processes approximately 100 million cubic feet of natural gas daily, from which formaldehyde and other chemical intermediates are produced.

E. I. du Pont de Nemours & Co. has purchased the government wartime neoprene plant at Louisville, Ky. for $13.2 million, from the RFC. The plant has produced neoprene at a rate of 50 to 60 million pounds per year for the past two or three years, and has a rated annual capacity of 132 million pounds. Du Pont built the plant as a commercial unit, then operated and expanded it for the RFC when it became part of the wartime synthetic rubber program.

Manufacture of cellulose nitrate plastic products is being discontinued by Celanese Corp. of America. Future activities of the plastics division are to be concentrated on cellulose acetate, cellulose propionate and new materials now in the development stage. Cellulose nitrate operations, already halted in part, will completely cease by the middle of the year.

Atlas Powder Co. has closed the coated fabrics division of its Zapon plant at Stamford, Conn. All the machinery and equipment in this division have been purchased by Consolidated Products Co. Inc., New York City.

A washing unit to eliminate fluorine gas present in smoke from Monsanto Chemical Co.'s Monsanto, Tenn. phosphorus plant is scheduled, and should be completed in about a year. The unit, to cost about $750,000, will eliminate the possibility of fluorosis induced in cattle by effluent fluorine from the plant, even though there is no evidence that any such injury has been caused by Monsanto operations in the area.

Richard L. Davies, named president of the new Pennsalt International Corp., a subsidiary to handle the Pennsylvania Salt Manufacturing Co.'s foreign interests. He has been assistant to the president of the parent compay.

Britain's chemical industry has played a large role in the export drive as well as keeping the home industries supplied. Chemical exports hit an annual rate of £80 million in the first half of 1948, as contrasted with £22½ in 1938. In July-August, the value of exported chemicals was £7.3 million, approaching the end-1948 target of a little over £8 million a month. Dyestuffs production is over 50 per cent above prewar, and plastics output is well over four times that of prewar.

Jefferson Chemical Co. will establish consolidated research facilities in Austin, Tex. where negotations for purchase of a 69-acre site with 5 buildings are virtually complete. Research, process development and pilot plant activities now carried on in New York City and Port Arthur, Tex. will be combined there when the buildings are remodeled.

Bakelite Corp.'s extensive expansion program which increased plastics productive capacity by 50 to 60 per cent during 1948, will permit further increases when other projects, mostly well under way, are completed this year. Completion of an entirely new plant at Ottawa, Ill. (now processing vinyl resins); additions to facilities in South Charleston, W. Va. (Vinylite increased, and polyethylene

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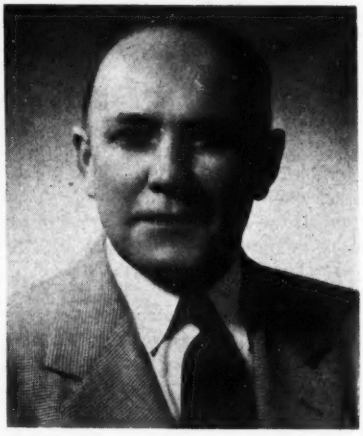
to be more than doubled), Texas City, Tex., and Bound Brook, N. J. (30 per cent increase in phenolics, polystyrene started); and new plants under construction in West Bath, Me. (woodflour) and Belleville, Ontario, Canada (urea resins, phenolics) are the principal factors in the expansion.



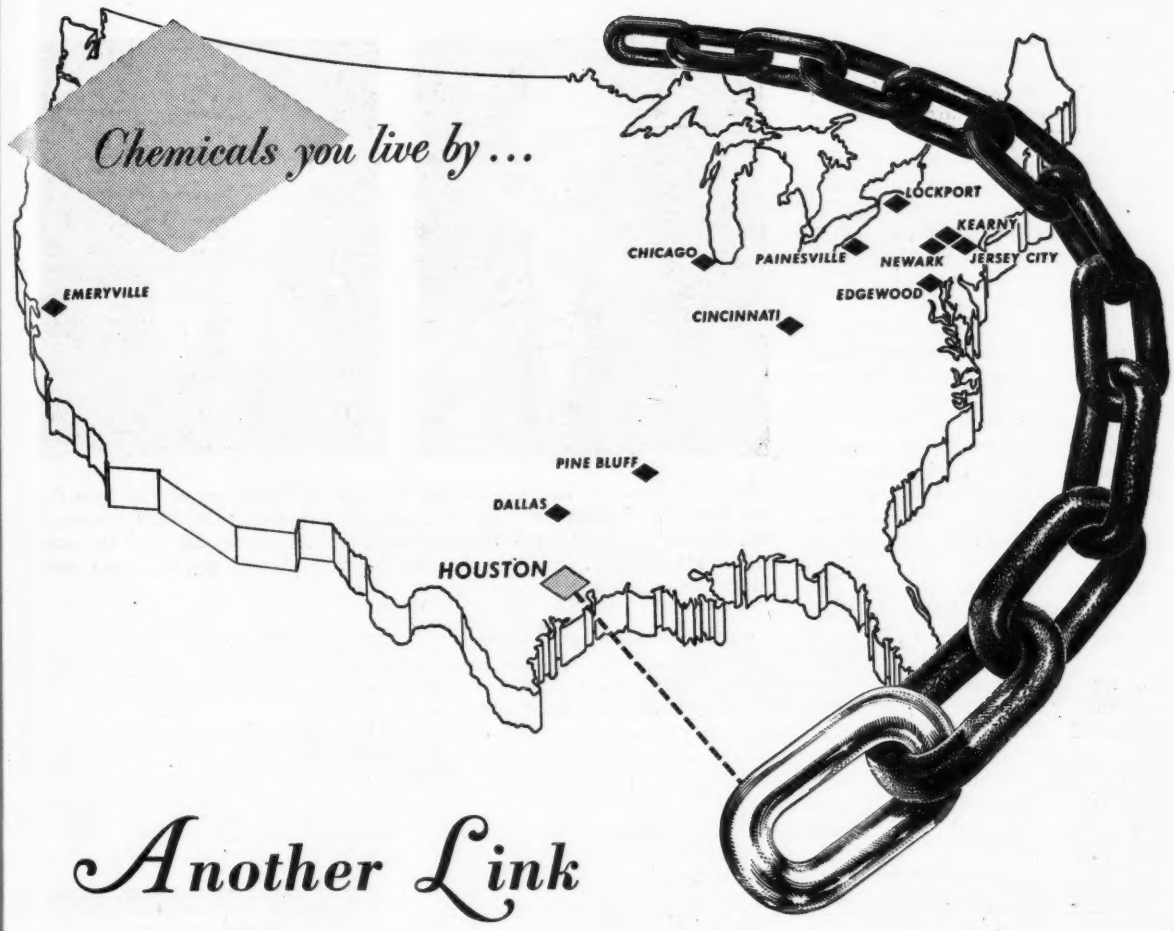
William R. Dedert, named to new post of general superintendent of Victor Chemical Works. He will have charge of manufacturing at the Chicago Heights, Ill., Nashville, Tenn., and Morrisville, Pa., plants.

Magnesium plants and other war-built government facilities transferred to the Public Buildings Administration for preservation in stand-by condition as industrial reserve for emergency production include: Anco Magnesium Corp., Wingdale, N. Y.; Diamond Magnesium, Painesville, Ohio; Dow Magnesium Corp., Velasco Tex.; Dow Chemical Co., Freeport, Tex.; Magnesium Reduction Co., Luckey, Ohio; Permanente Metals Corp., Manteca, Cal.; and New England Lime Co., Canaan, Conn.

The Aluminum Reduction Plant, Riverbank, Cal., designed to produce 108,000 of aluminum per year, is now offered for sale to relieve the national shortage of aluminum.

Thirteen volumes of the National Nuclear Energy Series have been declassified and are being edited for early publication. Chapters or sections of the NNES volumes represent about one-third of the 2400 documents so far declassified by the U. S. Atomic Energy Commission. McGraw-Hill Book Co. is the publisher under a contract with Columbia University, representing the AEC and its research contractors.

The Federal Works Agency and the Federal Security Agency have established river basin offices in key cities of the 14 basin drainage areas into which the country has been divided to expedite



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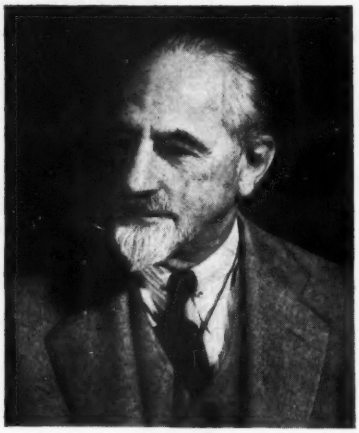
water pollution control programs. These offices will be operating centers for carrying on this work under the Water Pollution Control Act (River Rules, C. I., Sept., 1948, p. 373).

In connection with increased government attention to stream pollution, the former water pollution section of the Sanitary Engineering Division of the Public Health Service has been expanded into a separate division that will have this program as its province.

Increased demand for refinery and chemical plant equipment is spurring work on the new $100,000 Houston, Tex. plant of the General Welding Works, Inc. The first unit is scheduled for completion this spring, with further expansions to follow. The company builds oil field equipment, refinery units, cracking towers for oil and chemical plants, and tanks.

Standard Oil Co. (Indiana) and subsidiaries have been making and breaking new high records in every branch of the petroleum business. Average daily net crude production increased 15% over the 1947 average in the first 9 months of 1948. The company has opened several new areas, including structures in the Gulf of Mexico, which it reports as promising. Daily refinery runs are up 18% and total pipe-line traffic has increased 25%.



John V. N. Dorr (l), who has become chairman of the board of The Dorr Co., and Elmer R. Ramsey (r), his successor as president. Dr. Dorr, chemical, metallurgical and industrial engineer and prolific inventor, founded the company. Mr. Ramsey, with the company for thirty-four years, has been operating vice-president.

Research budget of Bituminous Coal Research, Inc., the national research agency of that industry, will exceed half a million dollars for the second successive year. Among projects supported is fundamental research on coal gasification, combustion and hydrogenation.

Precision Scientific Co., Chicago and Fritzsche Bros., New York, have established new $1,000 prizes for achievements in petroleum chemistry and in the field of flavor and perfume oils, respectively.

The new Elk Basin, Wyo. gasoline plant (principal owners: Stanolind Oil and Gas Co., Continental Oil Co., Carter Oil Co., Ohio Oil Co. and the Mackinnie Oil and Drilling Co.) is scheduled for completion in April. This

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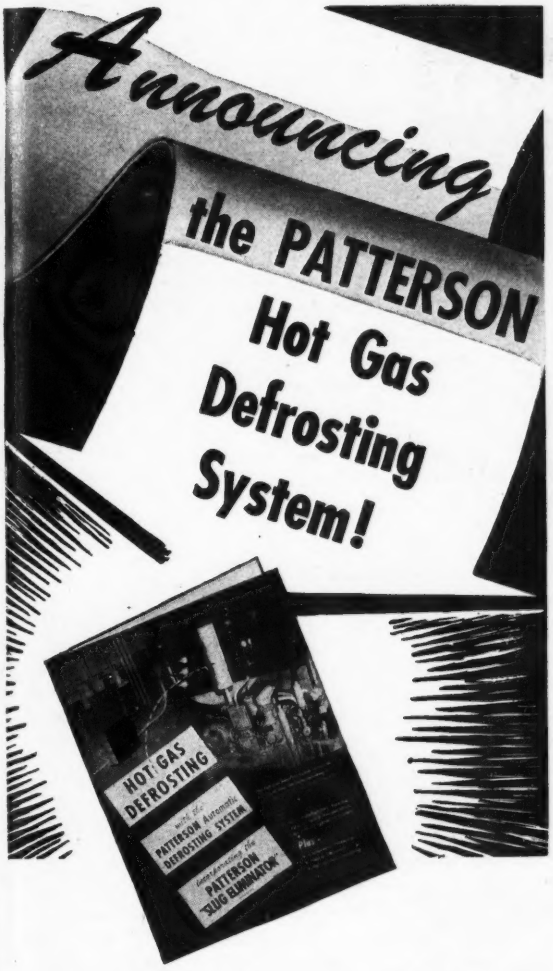

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Potassium Borate

Ammonium Biborate

Ammonium Pentaborate

PACIFIC COAST BORAX COMPANY

51 MADISON AVENUE, NEW YORK 10, N.Y. · CHICAGO 16 · LOS ANGELES 14

unique plant, while primarily a conventional gasoline plant, will also produce sulfur (70 long tons per days from the hydrogen sulfide in the gas), and will generate inert gas to inject into the Elk Basin field.

The Emil Greiner Co., manufacturers and distributors of scientific and industrial glassware, laboratory and chemical supplies, has recently moved to its new 9-story building at 20-26 N. Moore Street, New York 13, N. Y.

Four modern structures at Hercules Powder Co.'s nitro-glycerin plant, Kenvil, N. J., will soon be completed. These replace the three buildings destroyed by explosion last June.

O. W. Graham has completed the work of organizing in Tulsa, Okla., the new firm of INSTRUMENTS, INC., and is now the company's president. Mr. Graham perfected the recently developed Gamma Ray level control instrument known as the Gagetron. Instruments, Inc., serves not only as the national distributor of the Gagetron, but designs and manufactures all kinds of electronic and mechanical instruments.

Wilson & Geo. Meyer & Co., Pacific Coast distributors of agricultural and industrial chemicals, is constructing a $150,000 warehouse and office building in Los Angeles to serve its customers in Southern California, Arizona, Utah, Colorado and New Mexico.

International Paper Co. will build in Natchez, Miss., a $20 million rayon pulp mill if a bond issue to provide funds for the purchase of the site is approved by the people of that city. The proposed mill, which will have an output of 300 tons of rayon pulp daily, is said to be the first in the world to use hardwoods instead of soft woods in the commercial production of dissolving pulps.

Production is under way at the new 150-ton-per-day soybean oil solvent extraction plant of West Tennessee Soya Mill, at Tiptonville, Tenn. It replaces the firm's expeller mill which was destroyed by fire. Allis-Chalmers Mfg. Co. did the engineering and supplied the equipment.

United States Testing Co., Hoboken, N. J., has opened a completely equipped plastics laboratory available to the plastics industry for independent testing and research development. Specially designed air-conditioned rooms, 50-ton compression molding presses, a 150,000-volt machine for dielectric strength tests, and low temperature cabinets feature the installation.

GUMS:

GUM ARABIC
GUM ARABIC BLEACHED
GUM GHATTI
GUM KARAYA (Indian)
GUM TRAGACANTH
GUM EGYPTIAN
GUM LOCUST (Carob Flour)
QUINCE SEED
★
CASEIN

SPECIALTIES:

MENTHOL (Crystals)
★
TARTARIC ACID
★
CREAM OF TARTAR
★
EGG ALBUMEN
EGG YOLK
BLOOD ALBUMEN
★
JAPAN WAX
CANDELILLA WAX

GUMS
(CRUDE, POWDERED)
Chemicals and Oils

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CHICAGO: 919 N. MICHIGAN AVE., TEL. SUP. 2462

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TECHNICAL DATA

Grades	X, WW, WG, N, M, K
Color (Lovibond)	12 yellow, 1.1 red to 40 yellow, 6.5 Red
Melting Point (drop method)	175 to 182F
Acid Number	160 to 169
Saponification Number	165 to 174

CROSBY CHEMICALS, INC.
DE RIDDER, LOUISIANA

ARAPAHOE
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FOR SALE

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Let Us Supply Your Laboratory, Pilot-Plant or FULL COMMERCIAL REQUIREMENTS for These Useful Intermediates — At Costs Less Than Your Own, Lower Than You Think — And Without Bother To You!

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AMPHETAMINE HYDROCHLORIDE

AMPHETAMINE PHOSPHATE

DESOXYEPHEDRINE HYDROCHLORIDE

DESOXYEPHEDRINE PHOSPHATE

LAMEX CHEMICAL CORP.

Makers of Fine Chemicals and Pharmaceuticals

15 SPRUCE STREET • NEW YORK 7, N. Y.
Worth 2-2223

Richard E. Chaddock, new manager of Hercules Powder Co.'s sales research division. He succeeds Carl W. Eurenius, named sales director of cellulose products department.

CALENDAR *of* EVENTS

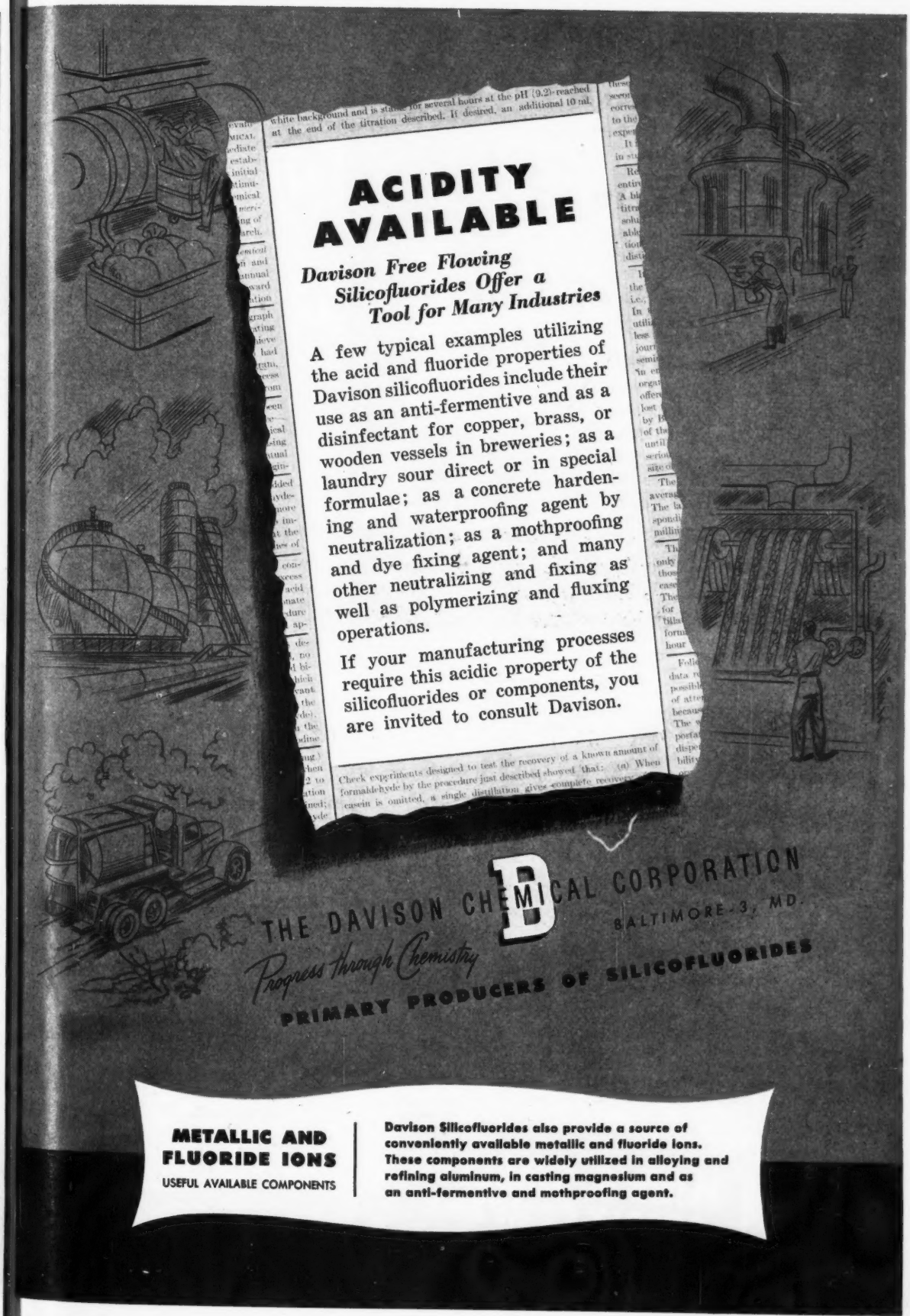
AMERICAN CERAMIC SOCIETY, 51st annual meeting, Cincinnati, Ohio, April 24-28.
AMERICAN CHEMICAL SOCIETY, 115th national meeting, San Francisco, March 27-April 1.
AMERICAN INSTITUTE OF CHEMICAL ENGINEERS, regional meeting, Los Angeles, March 6-10.
AMERICAN INSTITUTE OF MINING AND METALLURGICAL ENGINEERS, annual meeting, Fairmont Hotel, San Francisco, Feb. 13-17.
AMERICAN PAPER AND PULP ASSOCIATION, annual meeting, Waldorf-Astoria, N. Y. C., Feb. 21-25.
AMERICAN PHARMACEUTICAL ASSOCIATION, annual meeting, Jacksonville, Fla., April 24-30.
CHEMICAL MARKET RESEARCH ASSOCIATION, N. Y. C., Feb. 10.
COMPRESSED GAS MANUFACTURERS ASSOCIATION, annual convention, Waldorf-Astoria, N. Y. C., Jan. 17-18.
DRUG, CHEMICAL & ALLIED TRADES SEC., New York Board of Trade, 23rd annual dinner, Waldorf-Astoria, N. Y. C., March 10.
NATIONAL ASSOCIATION OF CORROSION ENGINEERS, annual conference and exhibition, Netherland Plaza, Cincinnati, Ohio, April 11-14.
SECOND PACIFIC CHEMICAL EXPOSITION, San Francisco, Nov. 1-5.
SOCIETY OF AUTOMOTIVE ENGINEERS, annual meeting, Hotel Book-Cadillac, Detroit, Jan. 10-14.
TECHNICAL ASSOCIATION OF THE PULP AND PAPER INDUSTRY, annual meeting, Commodore Hotel, N. Y. C., Feb. 21-24.
TANNERS' COUNCIL OF AMERICA, leather show, Waldorf-Astoria, N. Y. C., March 8-9.

PERSONNEL

Company Officers

• Benjamin W. Lewis has been appointed vice-president of the Witco Chemical Co. in charge of western sales of the Manufactured Products Division. Mr. Lewis has been with Witco twenty-two years, and has been active in technical development and sales promotion during that period.

• Ralph W. Rager has been elected vice-president of Oil Well Supply Co., United States Steel subsidiary, and


ACIDITY AVAILABLE
Davison Free Flowing Silicofluorides Offer a Tool for Many Industries
A few typical examples utilizing the acid and fluoride properties of Davison silicofluorides include their use as an anti-fermentive and as a disinfectant for copper, brass, or wooden vessels in breweries; as a laundry sour direct or in special formulae; as a concrete hardening and waterproofing agent by neutralization; as a mothproofing and dye fixing agent; and many other neutralizing and fixing as well as polymerizing and fluxing operations.
If your manufacturing processes require this acidic property of the silicofluorides or components, you are invited to consult Davison.
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BALTIMORE-3, MD.
Progress through Chemistry
PRIMARY PRODUCERS OF SILICOFLUORIDES
METALLIC AND FLUORIDE IONS
USEFUL AVAILABLE COMPONENTS
Davison Silicofluorides also provide a source of conveniently available metallic and fluoride ions. These components are widely utilized in alloying and refining aluminum, in casting magnesium and as an anti-fermentive and mothproofing agent.

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and
BORIC ACID

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609 S. GRAND AVENUE LOS ANGELES 14, CALIF.

Massco Grigsby
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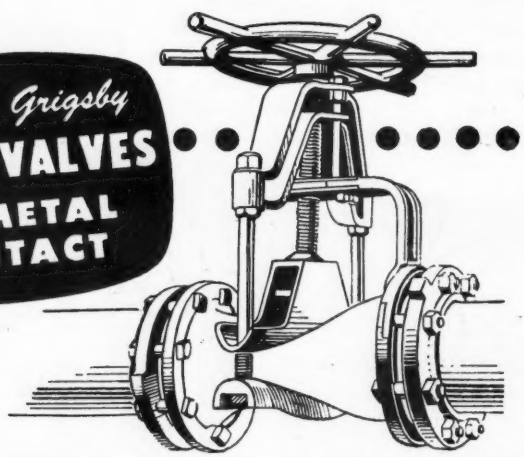

Recommended for transporting abrasive and/or corrosive pulps and liquids, where severe wear makes replacement of metal valves too costly. Rubber or synthetic sleeve closes tight even on solid particles. No packing glands; not affected by freezing or scale formation. Sizes: 1", 2", 3", 4", 6", 8", 10" and 12" dia.

MINE & SMELTER SUPPLY COMPANY
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Erwin P. Kraatz was named controller of the company. In his new post, Mr. Rager, who has been controller since October, 1944, will serve as administrative assistant to the president.

• Franklin L. Mettler has been appointed controller of the General Aniline Works Division of General Aniline & Film Corp. He was a lecturer on advanced accounting and cost accounting at University College, Rutgers University, in 1946 and 1947.

Carl H. Pottenger, assistant manager of American Cyanamid Co.'s plastics department since 1947, who has become assistant sales manager of the chemical division of Koppers Co., Inc.

Production

• Melvin L. McCreary, who began his career with the company as a chemist 12 years ago, has been named manager of the Williamsburg, Pa., plant of West Virginia Pulp and Paper Co. The appointment was made effective as of November 1.

• Harold E. Pletcher, manager of Ansco's Film Plant since 1946, has been named production manager. In his new post, he will supervise manufacturing operations in both the film and camera plants at Binghamton, New York.

• Walter T. Deegan, formerly with Monsanto Chemical Co., has been appointed manager of Joseph Turner & Co.'s midwest New Products Division. His headquarters will be at Turner's Chicago office.

Sales

• Frank M. Parker has been appointed manager of the General Sales Department, Merck & Co., Inc., manufacturing chemists. He succeeds J. L. K. Snyder, who recently was promoted to vice-president for domestic sales.

• Wallace E. Gordon has been named assistant director of sales in charge of

BICARBONATE of SODA
MONOHYDRATE of SODA
SAL SODA

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Established 1846
70 PINE STREET NEW YORK 5, N. Y.

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TERTIARY BUTYL HYDROPEROXIDE
TERTIARY BUTYL PERBENZOATE
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TERTIARY BUTYL PERMALEIC ACID
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Now available in addition to:

LUCIDOL* (BENZOYL PEROXIDE)
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ALPEROX* C (TECHNICAL LAUROYL PEROXIDE)
LUPEROX* (PEROXIDE PASTES)
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Compatible with Soap—
Contains no Caustic,
Free Chlorine or Carbolic Acid.

FOR WINERY AND DISTILLERY STILL PONDS
FOR CHEMICAL TOILETS
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GARBAGE DISPOSAL — specially suited for City Dumps
INSECT REPELLENT
SLIME CONTROL
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FOR CLOGGED DRAINS

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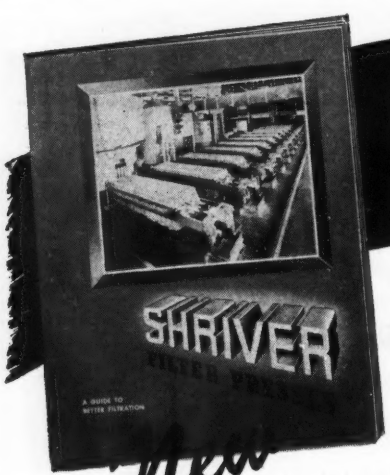
BOSTON 10. MASS. PROVIDENCE 3. R. I. HARTFORD 3. CONN. BALTIMORE 1. MD. PHILADELPHIA 6. PA.



YOUR GUIDE TO BETTER FILTRATION

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This new book tells what you should know about Shriver Filter Presses and their advantages in relation to the nature of your products, filtration rates and operating methods, under variable physical and chemical conditions. It provides a quick, easy chart method of determining filtering area and capacity requirements, and cost of new equipment. It is interesting, informative, helpful; free on request.

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822 HAMILTON STREET · HARRISON, N. J.

agricultural chemicals, adhesives, resale chemicals, and zinc products in the Grasselli Chemical Department, Du Pont Co. He previously had been sales manager for agricultural chemicals.

• George Black has been appointed public relations division manager of Cooper Alloy Foundry Co.

• Joseph C. Waldmann, formerly with the New York Quinine & Chemical Works, has joined Chas. L. Huisking & Co., Inc., in their Sales Department and will cover the metropolitan area and visit in intervals New York State, Pennsylvania, and Middle-Western States.

• Charles R. Winter, formerly with U. S. Rubber, has joined John Powell & Co., Inc. He has been appointed regional sales manager for the North Central states.

Research

• William M. Murray, Jr., has been named Director of Southern Research Institute. Dr. Murray joined the Institute in 1945 and has served as assistant director, then as acting director prior to his recent appointment.

• D. S. Davis, formerly technical editor at the Government Laboratories, University of Akron, is now professor of chemical engineering at Virginia Polytechnic Institute. He will continue to edit *Chemical Industries'* "Nomograph-of-the-month."

• Harry F. Pfann has been named manager of the Chemical Development Section, Chemical Division, of Koppers Co., Inc.

• F. H. Reed, chief chemist of the State Geological Survey Division, Illinois, has been sent to Japan by the U. S. Army on a scientific mission. He will assist the Japanese in organizing a national coal and lignite program.

Associations

• Warren Neal Watson, secretary of the Manufacturing Chemists Association, with headquarters in Washington, D. C., died on December 10. He had been ill for some weeks.

He had been executive head of the association since 1930, following service with chemical companies and as chief of the chemical division of the U. S. Tariff Commission.

• The Association of Consulting Chemists and Chemical Engineers has appointed Robert T. Baldwin executive secretary and assistant treasurer and A. B. Bowers assistant executive secretary for the calendar year 1949.

REGULAR SUPPLIES OF THESE PRODUCTS *from*

WATFORD CHEMICAL CORP.

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• ESTAX EMULSIFIERS

A range (Nos. 1-40) of poly-alcohol fatty acid esters. Typical selection and uses:—

No. 1. (Pentaerythritol Mono Stearate) for shaving creams, vanishing creams, water-soluble ointments.

No. 6. (Di Glycol Mono Stearate) for cosmetic creams, tablet coatings, etc.

No. 21. H(Propylene Glycol Mono Laurate) for plasticizers, ointments, lipsticks, skin creams, etc.

No. 32. (Pentaerythritol Di Palmito-Stearate) for all pharmaceutical uses, ointments, emulsions. Alternative for Lecithin.

• WETTING AND FOAMING AGENTS

1. "Watford" Non-ionic and Cationic Wetting Agents and Detergents. Range of specialized Wetting Agents and Disinfectants.
2. "Sulphosal" range. Hygienic foaming and cleansing agents for all purposes. Including SULPHOSAL 'S' (Sulphonated Lauryl Alcohol) liquid and powder.

• SOLVENTS AND DISPERSANTS

for a wide range of pharmaceuticals, especially those taken internally; dissolving in iodine, bromine, chlorine, sodium and potassium chloride, etc. Also for improving skin creams and other toilet preparations.

• FINE CHEMICALS

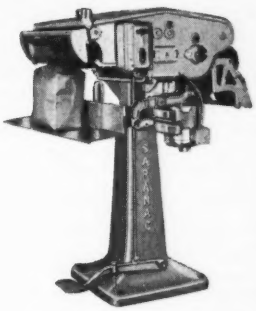
Sulphanilamides, (e.g. Sulphanguanidine, Sulphanilyl Mandelate, etc.); Salicylates (including Salol and Aspirin); Vitamins and Hormones with Intermediates, (e.g. Cholesterol); Alkaloids, (e.g. Ephedrine, Theobromine, Caffeine and their salts); Barbiturates; Thioglycollic Acid, Ammonium Thioglycollate and other salts.
Write for Fine Chemicals list just published.

• Prices and samples on request.

"SARANAC D-10" for fast-SIFT-PROOF-economical BAG CLOSURES . . . . . .

A single pass through the Saranac D-10" gives a stout, siftproof closure as fast as the operator can feed—up to 75 per minute. The double-reverse fold is formed automatically and locked with one to six staples driven simultaneously.

Get full information TODAY on the Saranac system for speedier packaging at less cost. Ask for Bulletin 154.



Saranac D-10" Bag Sealer

Here's How Saranac's Positive Seal Looks—No Chance for Leakage.

SARANAC MACHINE CO
BENTON HARBOR, MICHIGAN

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CARBONATES
HYDROXIDES
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(U. S. P. TECHNICAL AND SPECIAL GRADES)

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CHEMICAL SPECIALTIES

A department devoted to news of the chemical specialties field. Descriptions of new specialty products will be found in the New Products & Processes department.

Powell Sells Interests In Insecticide Company

John Powell, president of John Powell and Co., Inc., has disposed of his interests in the company to his associates William J. Pollert, H. Alvin Smith and Alfred Weed. The new owners will continue active management of the business, and will make no change in its financial or operating set-up. Mr. Powell will start a trade publication for consumers of building cleaning and maintenance supplies.

Powell has been associated with the insecticide industry for more than 35 years, and the company which bears his name is in its twenty-sixth year. Long an active member of the National Association of Insecticide and Disinfectant Manufacturers, Powell will continue to serve as treasurer of that organization. At a testimonial dinner in honor of his contributions to the industry, he was presented with a ticket for a trip around the world.

Liquid Masking Tape

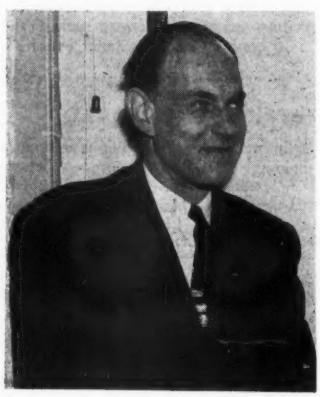
A new liquid masking solution greatly reduces time and effort in painting by keeping paint, lacquer and other coatings off wood, glass, metal and similar surfaces. The solution, based on Vinylite resins, is easily brushed on the surface to be masked. The masking solution dries in about ten seconds and then adjoining surfaces can be painted. When the paint is dry, the plastic shield can be peeled off like tape, thus saving the time-consuming work of removing excess paint by scraping.

Ramsell Products, Inc., Maywood, Ill., manufactures the solution called "Window Paint Shield." Distribution is through hardware and paint stores.

NAIDM Voices Confidence In Insecticide Industry

Conviction that aggressive merchandising would overcome the two-year slump in the insecticide business ("Bug Blues," CI, July, 1948, p. 27) was expressed at the thirty-fifth annual meeting of the National Association of Insecticide and Disinfectant Manufacturers, held last month in New York City.

Although the resistance of flies to DDT (see story on "Superflies" p. 33) was the major technical problem discussed at the meeting, several open forum sessions revealed that the slowness of business is a prime concern of the industry. In his annual report, Gordon B. Baird, president of the association, stated that there were too many willing to say that the household insecticide business is about dead, and urged that the market for insecticides as well as disinfectants, floor products, and deodorants be developed and sold. Both John Powell and Friar Thompson, in a discussion of the possibilities of household sprays, pointed out that there is an excellent future for such business if the manufacturer will modernize his products and merchandising methods. Throughout the meeting, the opinion that the industry has not spent enough money for advertising or consumer education was widely voiced.



G. M. Baird, Baird & McGuire, re-elected NAIDM president.

All present officers of the association were reelected for another term. They are: president, Gordon M. Baird, Baird & McGuire, Inc., Holbrook, Mass.; first vice-president, L. J. Oppenheimer, West Disinfecting Co., New York; second vice-president, C. L. Weirich, C. B. Dolge Co., Westport, Conn.; treasurer, John Powell, formerly John Powell & Co., New York; and secretary, H. W. Hamilton, of the company of that name, New York.

Markets Permanent Starch

A "permanent starch" said to keep clothes crisp through eight to ten launderings and also make cottons wear twice as long has been introduced by Perma Starch, Inc. It resists wilting of clothes in humid weather and retards fading and mildewing. The major ingredient of the material is a synthetic resin developed by United States Rubber Co.

The liquid plastic, called Perma Starch, has been successfully marketed on a trial basis in grocery stores in Chicago and Detroit. It will now be introduced on a nation-wide scale as rapidly as stepped-up production at a plant in Illiopolis, Ill., will permit.

The starch-like plastic requires no heating or cooking. One cup of the milky liquid is diluted with three cups of cool tap water. Clothes are dipped in, wrung out thoroughly and hung to dry. They can be ironed only slightly damp, thus reducing ironing time.

The new material is available in pint bottles. Each pint dilutes to half a gallon. This amount is said to accomplish as much starching as $2.50-worth of liquid corn starch, at less than one-third the price.

New Animal Repellent Developed by Goodrich

Prolonged tests of a new animal repellent developed by B. F. Goodrich Chemical Co. have proved that it repels grazing animals after they chew a few treated leaves. Certain types of insects also are discouraged by the action of the chemical.

The new formulation was tested by Maine Fish and Game Dept. biologists who sprayed alternate rows of strawberry and bean plants at the Swan Island game refuge. They discovered that the treated rows were not disturbed by deer while those without the spray had been mowed low by nibblers.

In tests thus far, one application was found to be effective until new leaf growth occurs. Taste, not odor, is the big factor, with the deer finding the treated plants very unpalatable, though not poisonous.

Crop damage by raiding animals amounts to millions nationally, and exceeds $150,000 annually in some districts of Maine.

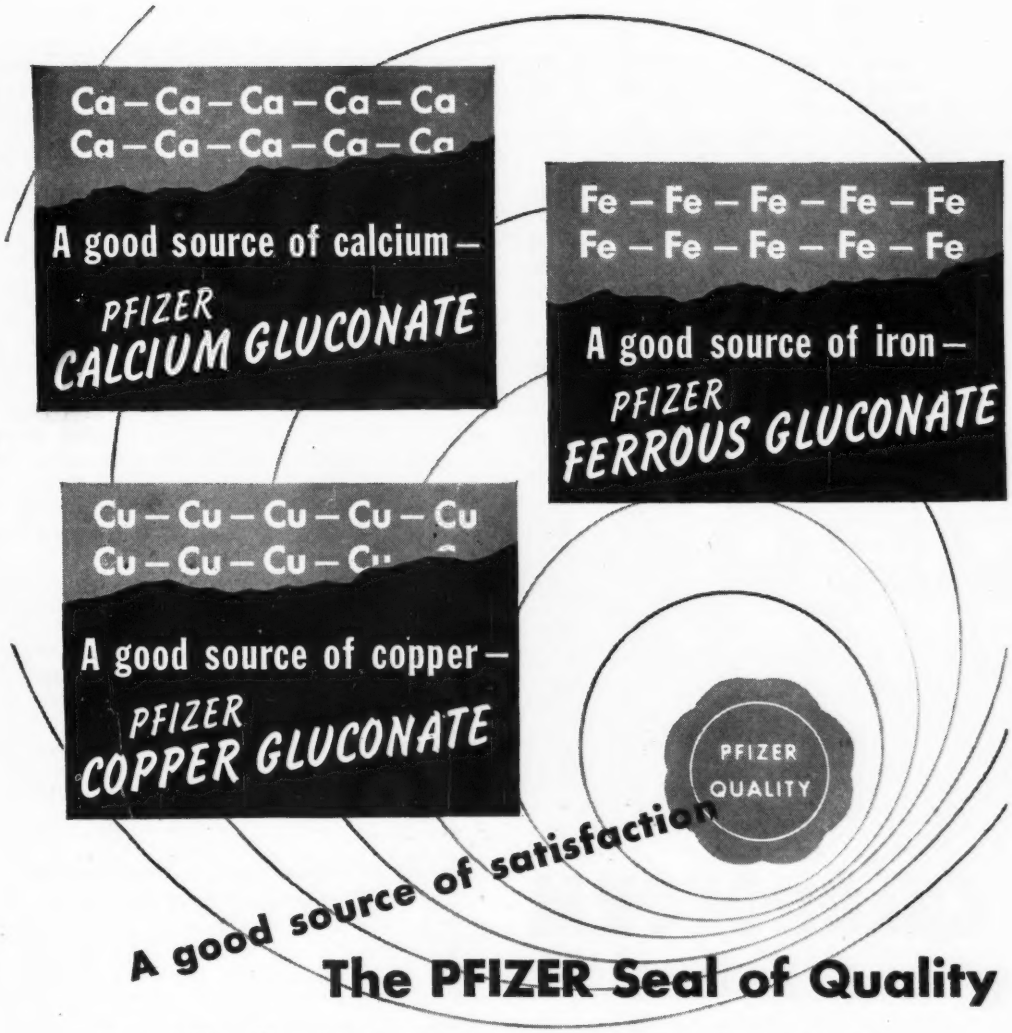
Hooker to Produce 2,4-D Intermediate

Hooker Electrochemical Co. is in pilot-plant production of sodium chloroacetate. This new product is a white non-hygroscopic powder. It dissolves completely and rapidly in water.

Sodium chloroacetate may be used in the preparation of various acetates and glycolates. Generally speaking, it may replace monochloroacetic acid, used in the manufacture of 2,4-D. The sodium salt has many advantages over the acid particularly with respect to storage and handling. In chemical processing, its use eliminates the usual neutralization step required for the acid.

Paisley Products Buys Park Leggett Altman

Paisley Products, Inc., New York City, has purchased the Park Leggett Altman Co., industrial adhesive manufacturers of Minneapolis, Minn. The purchase in-


Ca – Ca – Ca – Ca – Ca
Ca – Ca – Ca – Ca – Ca
A good source of calcium –
PFIZER
CALCIUM GLUCONATE
Fe – Fe – Fe – Fe – Fe
Fe – Fe – Fe – Fe – Fe
A good source of iron –
PFIZER
FERROUS GLUCONATE
Cu – Cu – Cu – Cu – Cu
Cu – Cu – Cu – Cu
A good source of copper –
PFIZER
COPPER GLUCONATE
PFIZER
QUALITY
A good source of satisfaction

The PFIZER Seal of Quality

Users of Pfizer Gluconates know the importance of *known quality* in a chemical. They realize that, in its operations, Chas. Pfizer & Co., Inc. combines the soundness of a long-established firm with the progressiveness of a constantly pioneering spirit.

From the company's biological research laboratories, for example, came the production of gluconic acid by a fermentative oxidation of glucose. And each of the salts of this acid reflect, in turn, benefits from the proper selection and control of manufacturing methods and procedures.

Other Pfizer Gluconates which may be of interest include Sodium Gluconate, Magnesium Gluconate, Manganese Gluconate, Acid Gluconic Technical, and Glucono-delta-Lactone. For further details on the present usefulness and potentials of Pfizer Gluconates, please address Chas. Pfizer & Co., Inc., 81 Maiden Lane, New York 7, N. Y.; 211 E.N. Water St., Chicago 11, Illinois; 605 Third Street, San Francisco 7, California.

PFIZER QUALITY

PFIZER

Manufacturing Chemists Since 1849

6726

cluded all assets of the firm, formulas, manufacturing processes and equipment. Improvement of plant and technical facilities is planned, increasing distribution of Paisley adhesives to an expanded territory to be serviced by the new plant. Renamed the Placo Division of Paisley Products, Inc., it will also act as sales agent for the parent firm, Morningstar, Nicol, Inc., of New York.

Vitamin B_{12} Prepared By Fermentation

Crystalline vitamin B_{12}, for the treatment of pernicious anemia, has been produced by fermentation in the research laboratories of Merck & Co., Inc. It has been isolated from a mold, *Streptomyces griseus*, which belongs to the same species producing streptomycin.

Isolation of vitamin B_{12} from liver was first reported last April by Merck chemists. Merck hopes that B_{12} by the new method can be made commercially available soon.

Radioactive Materials Give Crops No Benefit

Experiments with certain low level radioactive materials conducted during the 1948 crop year in 14 States and with 18 crops so far have not shown any beneficial effect upon either crop growth or quality. The materials used to apply radioactivity were a commercial radioactive product and radium.

The experiments were the first to be made under a special 2-year study to be carried on by the U. S. Department of Agriculture and cooperating agricultural experiment stations. The studies were undertaken last March at the request of the Atomic Energy Commission in order to determine the effects of radioactivity upon plant growth.

DDT Analog Promises Greater Fly Knockdown

Difluorodiphenyltrichloroethane, an analog of DDT called DFDT, has proved more potent than DDT itself against house flies and other flying insects, W. T. Sumerford, a government chemist reported at the fourth annual southwest regional meeting of the American Chemical Society in Shreveport, La. Preliminary studies also indicate that it is less poisonous than DDT to warm-blooded animals and fish.

DFDT, a low-melting white solid with a faint odor resembling ripe apples, was widely used as an insecticide by the Germans during the war, but has received little attention in this country. It does not possess the broad killing power of DDT toward all insects, but it has greater knockdown against flying insects, especially house flies. It does not have the residual killing power of DDT however.

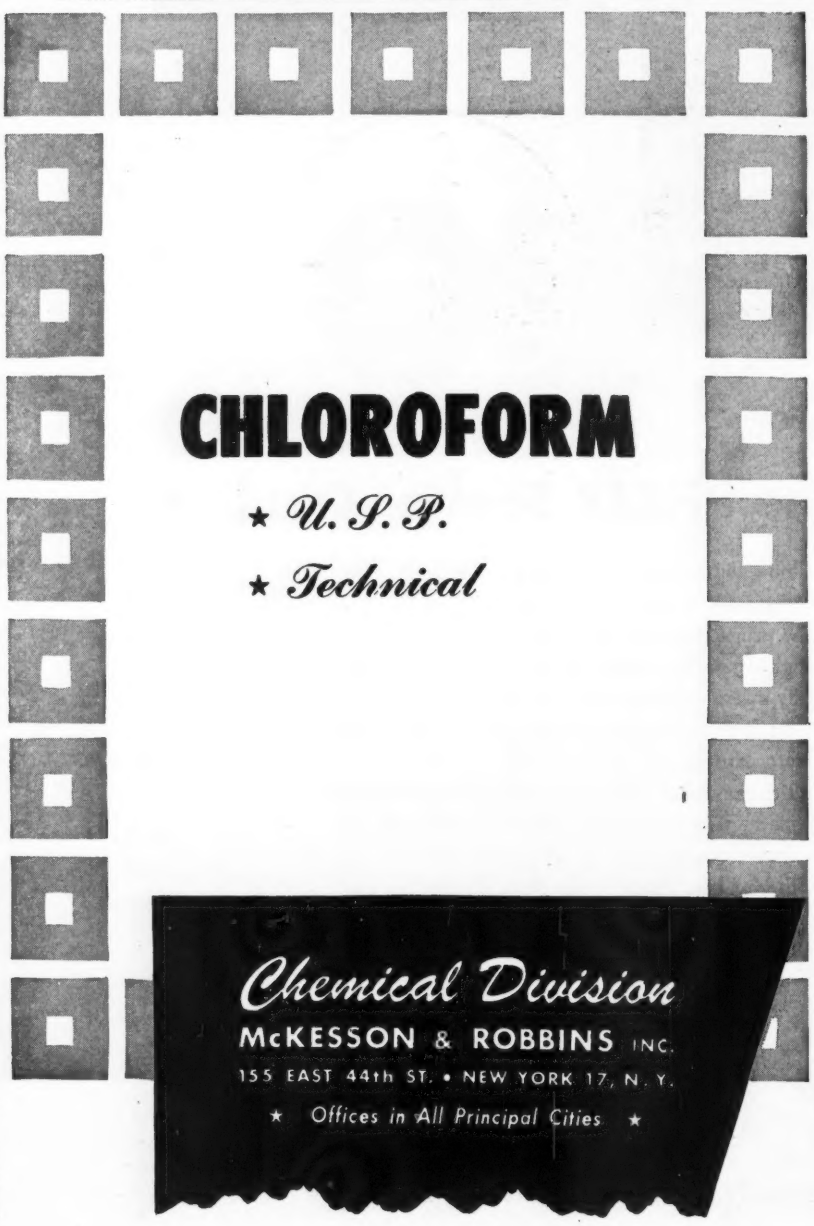
Conference Summary of Cotton Insect Research

A summary report of the conference of federal and state workers concerned with cotton insect research and control, held last November at Baton Rouge, La., is being distributed to entomologists, research and extension workers, the insecticide industry, and others concerned with cotton production. From their experiments and experiences in cotton insect control, the government workers have formulated this guiding statement for control recommendations for this year.

In addition to recommendations for the use of certain insecticides for control of cotton insects, the report presents information of value to industry in planning production programs. It contains some suggestions as to research needs in developing a more effective cotton insect control program. Copies are not available for general distribution.

Mothproofing Agent Backed by Policy

An insurance policy has been issued backing the unconditional five-year guarantee of the Bocon Chemical Co. against moth damage of fabrics treated with the company's mothproofing agent, Boconize. This compound is claimed to protect against moths throughout repeated drycleanings or launderings of the wool.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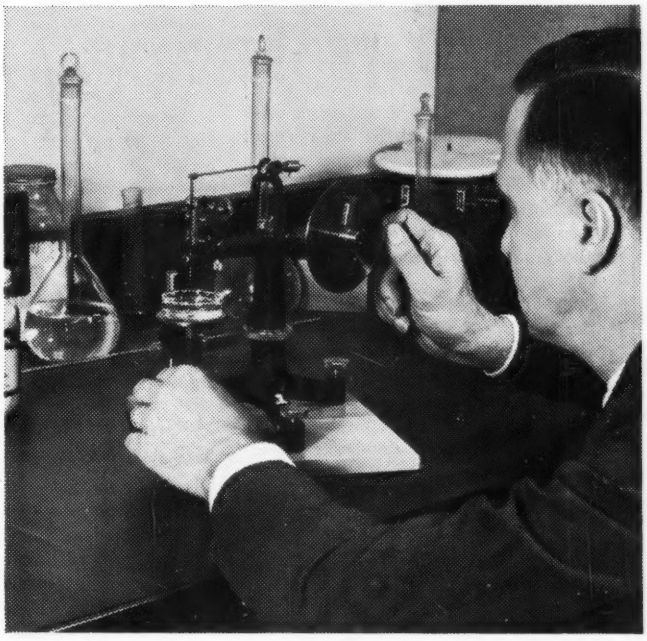

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CHEMICAL MARKETS

Alcohol May Drop To 30-35 Cents

The recent series of drops in the price of industrial alcohol may continue this year until the price reaches the 30- to 35-cent-a-gallon level. Current price is 49 cents, down in big drops from recent levels of 54 and 70 cents and the previous price of 87½ cents before the break.

Increased synthetic production and lower prices for molasses, source of 40-50 million gallons a year, are the reasons for the sudden price change. Molasses had been selling for 22 cents a gallon prior to the price break in November. It is estimated that the price has fallen to about 10 cents a gallon, and it may be even less for the 1949 crop.

The immediate cause of the break was the announcement that Publicker Industries, Inc., one of the major buyers of molasses, had purchased 80 million gallons remaining from the 1948 crop. The price was reportedly tied to the price of alcohol, and this enabled the company to lower alcohol prices to increase its sales.

Synthetic alcohol, of which about 115 million gallons are expected this year, will probably be lowered to meet the price of the natural material.

Upward Trend Continues For Essential Oils

There is definite evidence of an upward trend in the price of imported essential oils as prices have fluctuated within narrow limits, and in many cases have risen. Although the market for domestic oils has been generally weak, even some of these have shown strength and followed this rising trend.

One of the larger essential oils houses feels that a great many imported oils have reached bottom in price if a reasonable demand is maintained. This situation is the result of selling at below replacement cost which has led to underproduction. Another contributing factor in the impending bullish market is the hand-to-mouth buying practices of consumers who have kept inventories at a minimum.

50 Million Lb. Output For Polyethylene

As a result of an almost fourfold expansion in production facilities for polyethylene, supply will soon be in balance with demand for the first time since the war. New manufacturing facilities at Sabine River, Tex. and South Charleston, W. Va. are expected to come into production early this year and boost output to 50 million pounds in 1949. Present estimated output is about 15 million pounds a year.

Lower cost and versatility of applications are expected to contribute to the future growth of polyethylene markets. Nearly 80 per cent has been consumed by the wire and cable industry. This consumption is expected to be nearly double by 1950 and more than treble in 1953. Larger fields for this relatively new plastic are expected to be in the form of film for packaging, in the electrical and rubber industries, and in the chemical industry as chemical-resistant liners for tanks, drums and other containers and as closures, gaskets and piping.

Synthetic Organic Sales $2¼ Billion in 1946

In 1946 the sales value of synthetic organic chemicals and their raw materials produced in the United States remained steady at more than 2 billion dollars, according to the final report of the U. S. Tariff Commission. In 1946 production (35.4 billion pounds) and sales (24.6 billion pounds) were somewhat less than in 1945. Synthetic rubbers, plastics materials, and medicinals were the most important groups of synthetic organic chemicals produced in 1946.

Tars, tar crudes, and crudes derived from petroleum and natural gas made up the raw materials. About 837 million gallons of tar (oil-gas tar, water-gas tar, and coal tar) was recovered from all sources in 1946, compared with 899 million gallons in 1945, and an annual average of 872 million during 1940-44. The decline in 1946 was due to a substantial decrease in coal charged to coke ovens and a lower yield in crude coal tar per ton of coal carbonized.

Changing Tannin Picture Bright for Synthetics

Total U. S. production of all vegetable tanning extracts supplies less than half of domestic requirements, even when extracts made by domestic tanners for use in their own plants are included.

Quebracho and chestnut account for approximately 80 per cent of consumption. About 10 per cent of demand is supplied by wattle extract. Mangrove, myrobalan and valonia are other extracts in use.

Although the U. S. had imported quebracho wood, because of the efforts of Argentina and Paraguay to build up their own extraction industries, only the extract is now imported. Some chestnut ex-

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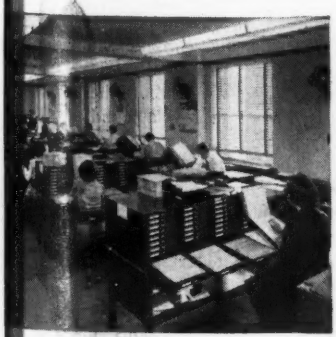

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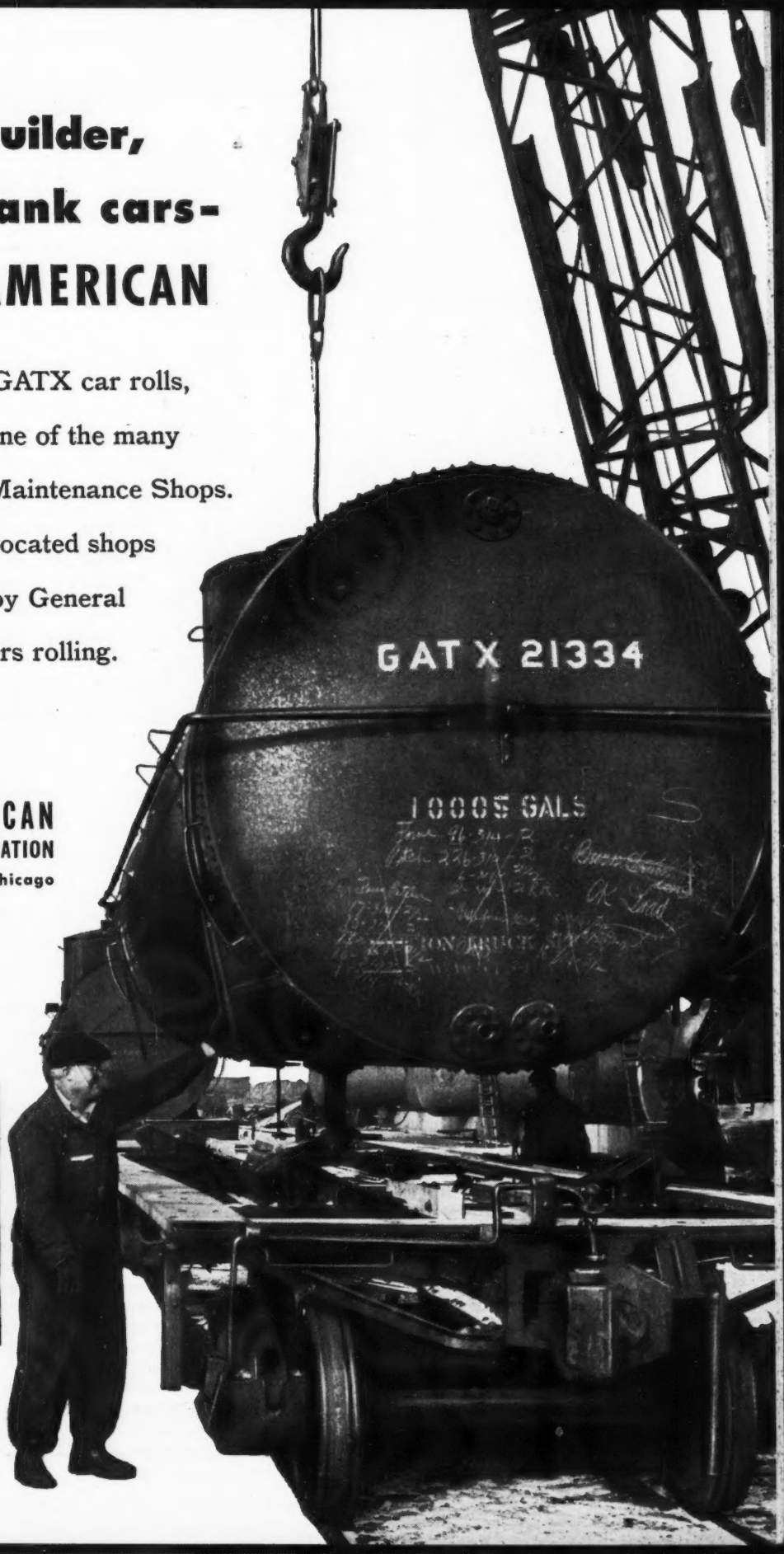
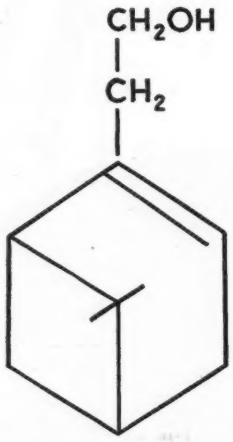


NOPOL

new bicyclic alcohol by Glidden now available



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Odor: Pleasant, characteristic

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tract is produced domestically despite the chestnut blight, but most of it is made from imported materials.

In some cases, imported tanning extracts are mixed with those of domestic origin to attain special characteristics in tanning blends. In the case of mangrove extract, U. S. consumers are awaiting rehabilitation of these industries in the Philippines and British Malaya, when imports will probably rise to prewar level.

Meanwhile, synthetic tannins, made largely from chromium salts, and used chiefly for shoe upper leather, shoe lining, glove, garment and other light leathers, are expected to become increasingly important. Logwood extract may be one exception to this trend. It appears to be one natural dye that has survived the development of synthetics, but this too is now being imported as the extract instead of as the raw material.

Rubber Demand to Hold Record Level

Consumption of new rubber in 1948 topped the million-ton mark for the third consecutive year. Rubber consumption totaled an estimated 1,075,000 long tons, as compared with 1,039,000 long tons in 1946 and 1,122,000 long tons in 1947. For the decade prior to 1939 annual consumption averaged less than 500,000 tons a year. Usage thus appears at the postwar rate to bear out a historic trend to double in each decade. Present forecasts indicate that rubber consumption during 1949 will be nearly as large as in 1948.

The long term trend toward increased consumption of rubber both in existing and new products continued in virtually all lines. This was notably true in mechanical rubber goods and in the rapidly growing field of latex foam products.

Market Review

Finding a definite tone in the market was like establishing reasons why the election polls went wrong. Price trends were mixed as the supply situation for most chemicals continued to improve. Purchases were limited either in an attempt to pare year-end inventories, or because purchasing power was off somewhat.

It appears that some chemicals may be overproduced, but the general feeling is that high production costs will mitigate against price cuts as competitive conditions become more severe. Production of methanol was estimated at 140 million gallons in 1948, and the market for it was quite loose. If some capacity is converted to ammonia, the expected surplus on the market this year will be averted. However, despite these conditions, an advance of 2 cents a gallon was posted by one producer. Formaldehyde also was in such good supply that some cut backs and layoffs of workers were forced. If there is too much capacity, near-margin producers may be squeezed out.

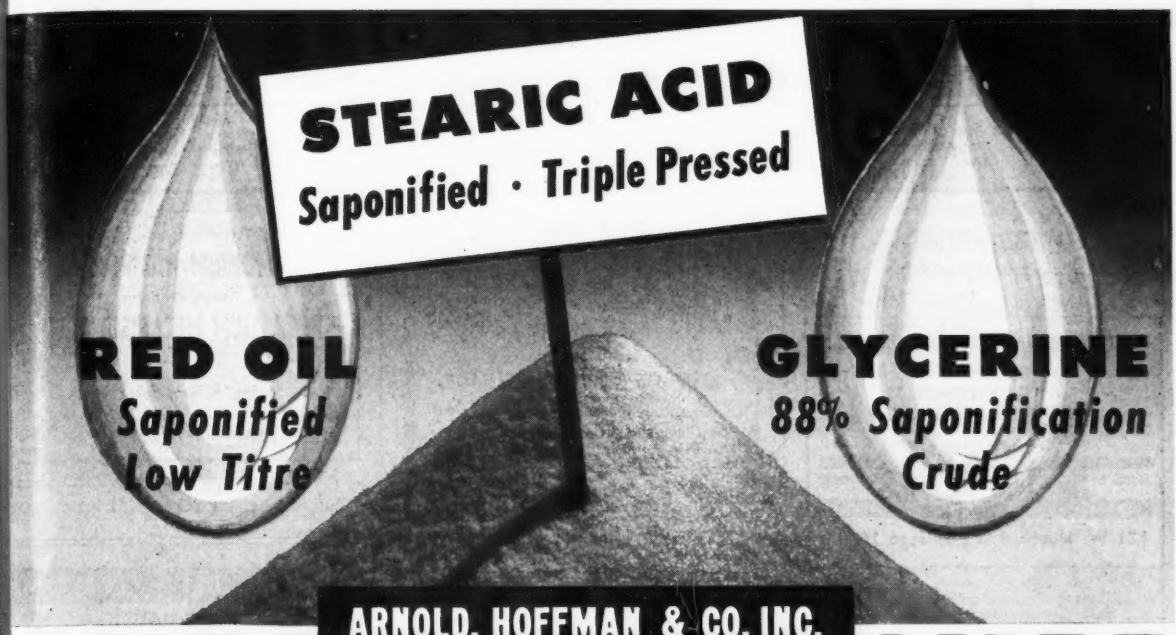
Effects of the drastic cuts in alcohol prices were expected to be felt in other solvents as well as acetic acid. Pressure should ease on acetone and isopropanol. In addition, with the prospect of a cheap raw material, plants to oxidize alcohol to acetic acid may begin production again. Market demand for acetic acid has been disappointing, but requirements of rubber producers in the Far East may stimulate export inquiry.

Naval stores received a shot in the arm in the form of an inquiry from England for 2,500 drums of gum turpentine. Other ECA purchases are expected.

Coal tar chemicals continued short, with benzol, toluol and xylol in the very tight category. Phenol and styrene claim much of the benzol, while aviation gas requires toluol. Little improvement is expected in coal tars because of the poor condition of by-product coke ovens, a large portion of which need replacement. Use of poor grade coal is another reason for a pessimistic view of supplies.

Natural glycerine stocks are down to 40 million barrels, as contrasted with the 50 million the trade feels should be on hand. Demand for the crude was brisk, and it appeared that a continuation of such demand could mean a squeeze, especially if no synthetic material reaches the market.

Among the price changes contributing to the mixed picture were increases of 8 per cent in dyes by a major producer. Anthraquinone was upped 5¢ a pound, and chromic acid was also advanced to bring the price in car lots to 25½¢ a pound. Other increases: lead arsenate, 1½¢ a pound; titanium pigments, ½¢ a pound; tetraethyl lead, 7 per cent up to 38.9¢ a pound for the aviation mix (as of Feb. 1); anhydrous ammonia, $5-$15 a ton; trichloroethylene and perchloroethylene, ½¢ and ¼¢ a pound, respectively. On the down side were a 2¢ reduction in DDT, the repeated declines in industrial alcohol, and reductions in camphor, menthol, some essential oils, penicillin, gum turpentine, and ethyl acetate.



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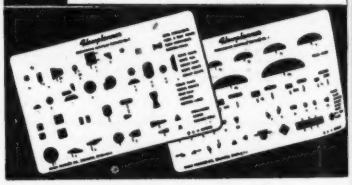

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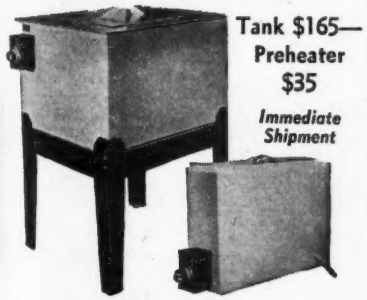

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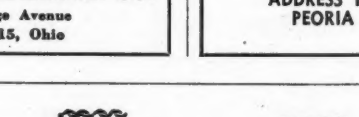

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Part 2 of this report was made possible by the excellent cooperation of the Illinois-Kentucky fluorspar producers, a number of fluorine chemical manufacturers, and various Federal Government agencies, especially the Chemicals Unit (Industry Division), Bureau of the Census. U. S. Department of Commerce.

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COLLEGE TRAINEES

(Continued from page 70)

action, vessels safely manned by a day-dreamer.

Immaturity, unfortunately, is difficult to recognize. As immature persons grow up, they often become skillful at justifying or concealing their childish characteristics. They become adept at excuse-making, they learn to be affable, even persuasive, and often are very personable. It is for that reason that college recruiters are often misled when they are unduly influenced by academic achievement, high I. Q., and good personal appearance of potential trainees.

However, while academic achievement is desirable, it is not necessarily a sign of ability to work face-to-face with other people in ordinary business situations. The "greasy grind," as he is sometimes called by less able students, may be able to produce well under circumstances which reward personal effort and personal achievement, but where his efforts must be confined with others, on a harmonious basis, there is no reason to believe, *on his evidence alone,* that he will function more satisfactorily than some other student with lower grades.

Then, also, there are men, who because they found college work easy, never developed strong habits of industriousness. As a result, when confronted with the problems of practical business and with strong competition usual in specialized fields, they become bewildered and lost. They take refuge in shifting responsibilities and avoiding decisions.

Turning to high I. Q.'s, here too, such a quality is helpful, but to what extent? Trainees with extremely high I. Q.'s are occasionally recruited for jobs which require only an ordinary intelligence. The extra margin of intelligence, so to speak, is usually not employed in doing the job better because there is usually a pattern which the job must follow. The result in some cases is that the young man with the high I. Q. will soon get bored with his job and irritable with the people about him.

High I. Q.'s are worthy of respect, but the important point is that a trainee's intelligence must be geared to the job, to the product, to the personnel and customers involved. An Albert Einstein would probably fail as a salesman of meat products, but probably do well explaining and selling the virtues of an electron microscope.

Finally, recruiters are always impressed by appearance. Recruiters who seek sales or executive trainees, for example, invariably seem to grope for the tall, manly type, the kind which, as in the movies, always inspires confidence by his forthrightness, by his poise, his dignity and personality. This is an unconscious but common error made by interviewers who are using a reverse twist on the methods of the Italian psychologist, Lombroso.

Lombroso, it will be recalled, issued all sorts of manuals on "the stigmata of degeneracy." Criminals had certain physical characteristics, said Lombroso: ears of certain dimensions, low foreheads, heavy jaws, thick fingers, etc. The theory was soon exploded when it developed that many of the Italian clergy and nobility of his time also had some of these characteristics.

There is no "executive type" or "sales type" or "scientific type" or "bookkeeper type," despite the casting used in the movies which merely reinforce our prejudices in that direction.

Unfortunately, unless interviewers are sharply on guard against this tendency, they are apt to be led astray by such personal biases and predilections.

Also, as part of this bias, there is the interviewer's aptness to choose men who appeal to him *personally.* Sometimes interviewers choose men who (unconsciously) remind them of their sons; occasionally they lean towards some physical characteristic which charms them—e. g., red hair, blue eyes, hairy or hairless hands, or conservative clothes, or "collegiate" clothes, etc. These biases are hardest of all to eradicate in making choices of college trainees, but it can be done.

The answer to the problem of how to choose proper college trainees is two-fold: (1) keep clearly in mind the qualifications for the job, and (2) use a patterned interview which permits the interviewer to explore all facets of the applicant's background. This latter will give the interviewer a factual basis for judging whether the trainee does have the qualities which the company seeks—and this judgment must be made upon careful evaluation of what the candidate *has done* rather than on what he says he will do.

In cases where this procedure has been followed, the degrees of success have been high.

The problem of college trainees would not be a serious matter were it not for the fact that most top executives of the next generation are expected to come from such present-day trainees. Where they are well-chosen, realistically evaluated by validated procedures, they are a great asset to their companies. Where, however, they are badly chosen, as seems to be the true situation in many cases today, they not only dissipate company assets, but disrupt employe morale and generally prove to be failures or half-failures in carrying out the responsibilities for which they are employed.

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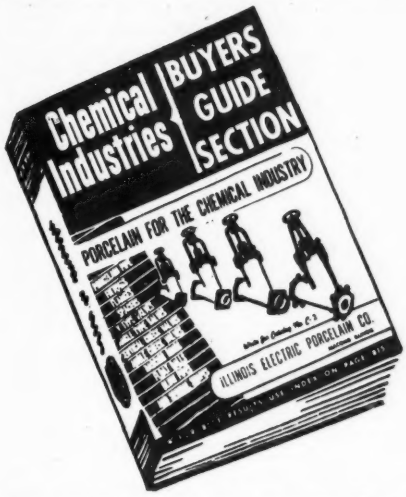

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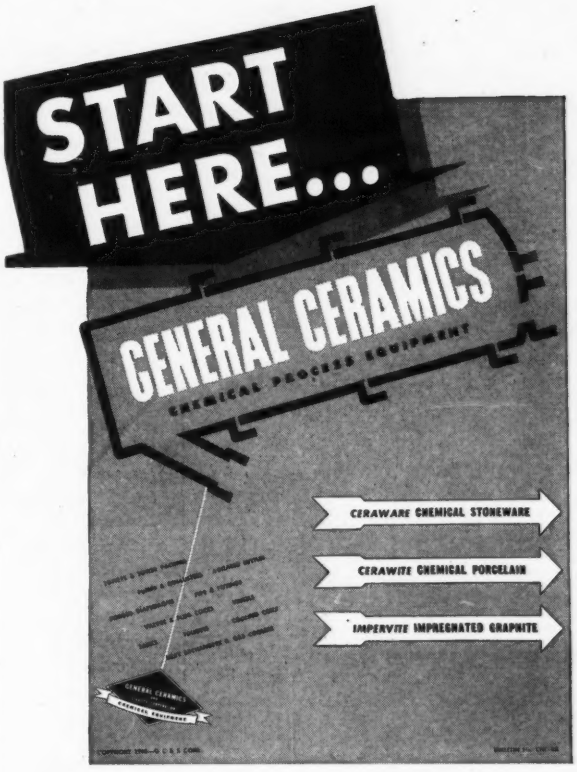

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FROM WHERE WE SIT

by "DOC"

ONE OF OUR READERS contributes the thought that chemists must have been contemplating the heavenly bodies — whether through telescopes or on the boardwalk at Atlantic City, he doesn't say — in view of the astronomical and astrological connotations of Planetary Chemical Co. and Aries & Associates.

We would consider his hypothesis more "Sirius"-ly if the head of either company were an Irishman named "O'Ryan."

WRITING IN *The Leather Trades' Review,* Mr. A. E. Ewens explains the chemist to the nontechnical tannery owner:

"There are two things you must find out about [the Chemist]—what he knows, which you pay for in cash, and what he does not know, which you pay for in kind. . . .

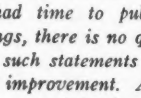
"Let us consider some of the points arising from the analysis of lime. If the lime is already hydrated it is easy. The Chemist happily rips open bags according to the formula $\sqrt{N}/2$, samples a bit from each, and finally bears off to the laboratory a teaspoonful. Rock lime is a far more difficult problem. It is heterogeneous, which means that if a sample from here and a sample from there give different answers in the analysis, he has an excuse ready. Perhaps to you a lump of lime is just a lump made of lime. To your Chemist it is a lot of things, many of them perhaps a little imaginary.

"Suppose then you have just received a truckload of lime, and he thinks it ought to be analysed. Great care is necessary in selecting the representative sample. He must avoid the top as it will have been unduly affected by atmospheric deterioration. He must avoid the bottom as it will have picked up impurities from the bottom of the truck. If he takes the centre it will not be a representative sample of the whole. He then goes to the canteen to think it out."

The author then describes Mixing and Quartering and all that, and the first attempt at analysis. He continues:

"After a silence of a few more days, perhaps occasioned by a few surreptitious repeats, he will present you with the Report, and here comes the first important part of your education, the knowledge of how to receive this contribution to your prosperity. The right attitude is very important. Between the cold and heartless leave-it-in-the-pending-tray-I-am-very-busy and the slushy I-knew-you-could-do-it-old-man lies the true blend of authority and interest. No sickly smiles, please, and no what-on-earth-is-all-this-about.

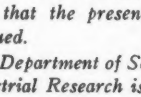
"The result itself, for any kind of analysis, will always bear one or two distinct features. You will notice that the percentages all tot up nicely to 100. . . . Moisture content is usually a help in this respect. . . . Also he will undoubtedly use a slide-rule, on which the third-figure-fiddle is far more simple than when using ruthlessly accurate logarithms. Some slide-rules are remarkably flexible."



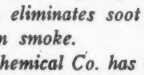
SCIENTISTS HAVE COME UP with the rather startling observation that hunger is the "physiological and psychological state produced by inadequate food." We do not find it in our heart to disagree with that lucid discovery, but we're not so sure about the symptoms, which are described as a "rather indefinite state of physical restlessness accompanied by a more or less vaguely unpleasant subjective feeling."

When we woke up Christmas morning there was nothing indefinite about our physical restlessness: we were just plain miserable until we had our bacon and eggs and coffee. And after Christmas dinner — turkey, stuffing, cranberry sauce and all the fixings — we had a "vaguely unpleasant subjective feeling" that was produced by quite the opposite of hunger.

If we're throwing big words around, leave us at any rate make them definitive!



MAKERS OF SOAP, synthetic detergents and other specialties are missing a bet by not letting some important personage sit in their products before they sell them. The Aga Khan, spiritual leader of India's Moslems, couldn't get back to India, so two of his followers had a velvet-wrapped can of his bath water flown to them from Paris. Purchase price: $6,400.



FIRST IT WAS insect repellents, then dog and cat chasers. Now a shipwrecked mariner can throw certain odorous salts in the ocean to keep sharks away. It all reminds us of the British colonel, recently returned from India, who kept sprinkling anti-lion powder on the road behind him as he traveled about the countryside. "But there are no lions in England!" his friends expostulated. "I'm just as glad," snapped the colonel. "Frankly, I don't think the powder's any d—— good!"

FIFTEEN YEARS AGO

(From Our Files of Jan., 1934)

Year end chemical stock quotations show an appreciable gain over last year's closing figures. While none of the leading chemical companies have had time to publish final '33 earnings, there is no question but what such statements will record decided improvement. Also, it is generally accepted that by comparison with other basic industries the chemical field has enjoyed good business.

Charles L. Reese, retired Du Pont chemical director, will serve as president of the American Chemical Society during the coming year. Roger Adams, head of the chemistry department, University of Illinois, is president-elect.

American Cyanamid and Chemical Co. has acquired Maryland Chemical, Baltimore. The company will be operated as a Cyanamid subsidiary under the direction of Samuel M. Leidy, vice-president and general manager.

Presidential approval has been granted the Tariff Commission's report on the tariff status of synthetic camphor. The Commission recommended that the present 5¢ rate be continued.

The British Department of Scientific and Industrial Research is experimenting with tars produced by low - temperature carbonization.

THIRTY YEARS AGO

(From Our Files of Jan., 1919)

The Perkin medal has been awarded to Dr. F. G. Cottrell for his invention of the precipitation process which eliminates soot and chemicals from smoke.

Monsanto Chemical Co. has purchased a four-story building at 12 Platt St., N. Y., for the storage of wares and the expansion of its business.

The Chemical Warfare Service has distributed samples of poison gas to dyestuff manufacturers for experimentation purposes.

The toluol in 70 per cent of the T. N. T. used in government shell-making factories during the war was a by-product of the illuminating gas industry in New York City.

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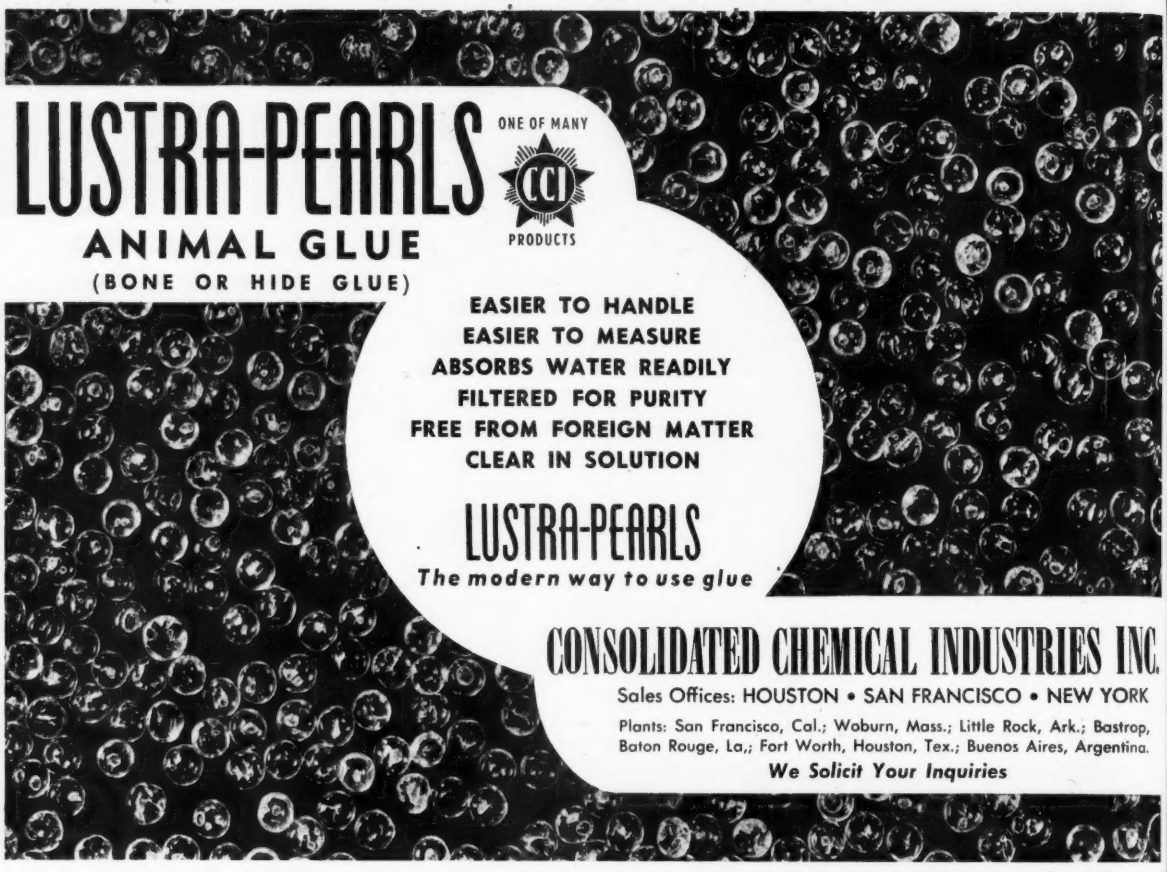

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Requests for further information or photostated copies of Canadian patents should be addressed to the Commissioner of Patents and Copyrights, Department Secretary of State, Ottawa, Canada

U. S. Patents from Official Gazette—Vol. 614, Nos. 3, 4; Vol. 615, Nos. 1, 2, 3 (Sept. 21-Oct. 19)
Canadian Patents Granted and Published Oct. 12-Nov. 9

*Organic

Preparing a solution of a member of the group consisting of the organic peracids and their alkali forming salts which comprises reacting an alkyl ester of a carboxylic acid with an alkaline aqueous peroxide solution. No. 2,448,252. William R. Cornthwaite and Arthur A. Elston (to E. I. du Pont de Nemours & Co.).

Nitrile-producing process, the steps of maintaining two ammonia-fatty-acid reaction zones, passing fatty acids into the first of said zones, heating said acids in said zone to a liquid phase reaction temperature, contacting the same with ammonia vapors evolved from the second of said zones, passing high boiling fatty acid residue from said first zone to said second zone contacting the same in said second zone with ammonia vapors, and withdrawing the stripped high boiling residue as pitch from said second zone. No. 2,448,275. Ralph H. Potts (to Armour & Co.).

Activated carbon product consisting essentially of granular petroleum coke coated with a partially oxidized channel carbon black. No. 2,448,337. Leonard Wickenden.

Synthesis of organic carboxylic acids which comprises reacting an olefin hydrocarbon having from 2 to 10 carbon atoms with carbon monoxide and water in the presence of a metal carbonyl catalyst of the class consisting of nickel and cobalt carbonyls. No. 2,448,368. William F. Gresham and Richard E. Brooks (to E. I. du Pont de Nemours & Co.).

Sulfonating aromatic hydrocarbons in admixtures with aliphatic and alicyclic hydrocarbons which comprises mixing a hydrocarbon mixture with a sulfonating agent and an amount of acetonitrile sufficient to dissolve substantially all of said aromatic hydrocarbons and to hold substantially all of said sulfonating agent in solution. No. 2,448,370. Donald S. Henderson and Alexander N. Sachanen (to Socony-Vacuum Oil Co.).

Preparation of aliphatic carboxylic acids from steam, carbon monoxide and an olefinic hydrocarbon in the presence of a catalyst formed prior to the said reaction, said catalyst being a member of the class consisting of nickel carbonyl and cobalt carbonyl, in the presence of active carbon. No. 2,448,375. Alfred T. Larson (to E. I. du Pont de Nemours & Co.).

Para-([N]-dialkyl pyrryl) benzoates. No. 2,448,408. Souren Avakian (to The National Drug Co.).

Separating two aromatic hydrocarbons having the same number of double bonds per molecule which comprises passing through a body of silica gel, thereby selectively adsorbing one of said aromatic hydrocarbons. No. 2,448,489. Alfred E. Hirschler (to Sun Oil Co.).

Partially neutralizing an aqueous solution of aconitic acid with a basic inorganic compound and heating the resulting solution to decompose the aconitic acid into itaconic acid and carbon dioxide. No. 2,448,506. Joseph A. Ambler and Alfred Laurence Curl (to the U.S.A. by the Secretary of Agriculture).

In the chlorination of starch, the process comprising maintaining the starch immersed in liquid chlorine maintained under super-atmospheric pressure until chemical combination between the starch and chlorine has occurred, resulting in the evolution of hydrogen chloride. No. 2,448,510. Harold Nathan Barham (to Sharples Chemicals, Inc.).

Polyhydric alcohol ester of benzoic acid selected from the group which consists of those in which the carboxyl aryl group is linked directly by a single bond to an ethylenically bonded carbon and those in which the carboxy aryl group is linked to an ethylenically bonded carbon through a carbonyl group. No. 2,448,520. Martin E. Cupery (to E. I. du Pont de Nemours & Co.).

Separating dipentaerythritol from a mixture of pentaerythritol and dipentaerythritol. No. 2,448,566. Joseph A. Wyler (to Trojan Powder Co.).

Preparing glycidyl esters by reacting an anhydrous alkali metal salt of an acid selected from the group consisting of lauric, myristic, palmitic, stearic, oleic, riconoleic, linoleic, linolenic, butyric, abietic, elaidic, succinic and sebacic acids, with a molar excess of epichlorohydrin and a minor amount of a substance taken from the group consisting of oxides, hydroxides, and carbonates of alkali and alkaline earth metals under anhydrous conditions. No. 2,448,602. Ernest B. Kester and Henry M. Preusser (to the U. S. A. by the Secretary of Agriculture).

An alkylol amine salt of a saturated hydroxy higher fatty acid. No. 2,448,626. Benjamin B. Schaeffer (to U. S. A. by the Secretary of Agriculture)

Preparing ether acetals by reacting in the presence of a mercury catalyst and a strongly acidic catalyst a vinyl ester of a saturated monocarboxylic acid of 2 to 4 carbon atoms and an ether alcohol of the formula

$$R'(OR'')_xOH$$

wherein R' is a hydrocarbon group, R'' is an alkylene group of 2 to 3 carbon atoms, and x is an integer from 1 to 12. No. 2,448,660. Willard J. Croxall and Harry T. Neher (to Röhm & Haas Co.).

Compound conforming to the structural formula

$$R\text{—}CSS\text{—}NH_3R_1R_2$$

in which R is furyl, R_1 is selected from the group consisting of aliphatic and aromatic radicals and R_2 is selected from the group consisting of aliphatic radicals and hydrogen. No. 2,448,714. Albert F. Hardman (to Wingfoot Corp.).

Disubstituted barbituric acids wherein the substituents are in the 5-position, and wherein one of said substituents is a member selected from the class consisting of alkyl and alkenyl groups and the other is a member selected from the class consisting of 2-benzimidazole, 2-alkyl-benzimadazole, and 2-alkenyl-benzimidazole groups. No. 2,448,722. Gustav J. Martin and Souren Avakian (to The National Drug Co.).

In the process of adding bromine to an unsaturated organic compound, the improvement which comprises intimately contacting said compound with bromine while at least one of said compound and said bromine is dissolved in liquid sulphur dioxide. No. 2,448,739. John Ross (to Colgate-Palmolive-Peet Co.).

Producing a 1,4 dicyano butene-2 which comprises reacting a 1,4 dihalo butene-2 of the group consisting of 1,4 dichloro butene-2 and 1,4 dibromo butene-2 with a copper cyanide to replace each of the halogen atoms in said dihalo butene-2 with a cyano group, said reaction being conducted under substantially non-aqueous conditions in the presence of a substantially non-aqueous non-polar liquid, said liquid being a solvent for said 1,4 dihalo butene-2 and unreactive with 1,4 dicyano butene-2, copper cyanide and the aforesaid dihalo butene-2. No. 2,448,755. Carl N. Zellner (to Tide Water Associated Oil Co.).

Method of introducing the hydroxyethyl radical into a substance of the group that consists of the phenols, the mercaptans, amines containing reactive hydrogen, the alcohols, and the carboxylic acids, which consists in reacting such substance with an ethylene ester of a group that consists of ethylene carbonate and ethylene sulfite. No. 2,448,767. Warner W. Carlson (to Mellon Institute of Industrial Research).

Adjusting an aqueous solution of a low-methoxyl pectinic acid to a pH not exceeding about 2 with a mineral acid thereby to precipitate the low-methoxyl pectinic acid, and separating the low-methoxyl pectinic acid from the acidified solution. No. 2,448,818. Rolland M. McCready, Harry S. Owens and William D. Maclay (to the U. S. A. by the Secretary of Agriculture).

Treating an aqueous suspension of an alkali earth aconitate with sulfuric acid in an amount less than chemically equivalent to the actions present in the aconitate to convert most of the aconitates to aconitic acid leaving present a small quantity of the aconitates, and heating to decompose the aconitic acid in the solution to itaconic acid and carbon dioxide in the presence of the aconitates. No. 2,448,831. Earl J. Roberts and Joseph A. Ambler and Alfred Laurence Curl (to the U. S. A. by the Secretary of Agriculture).

Continuously removing phthalic anhydride from vapors which comprises continuously cooling said vapors initially at a temperature varying between 130° and 450°C. down to a temperature between 50° and 95°C. by bringing said vapors into direct and intimate contact with a water spray whereby a major proportion of said phthalic anhydride is condensed and precipitated as anhydride from said vapors. No. 2,448,868. Walter M. Davis (to Monsanto Chemical Co.).

Trimethylenebenzomorpholine azo compounds. No. 2,448,869. Joseph B. Dickey and James G. McNally (to Eastman Kodak Co.).

Azo compounds containing a triazole nucleus. No. 2,448,870. Joseph B. Dickey and James G. McNally (to Eastman Kodak Co.).

Azo compounds containing a tetrahydroquinoline nucleus. No. 2,448,871. Joseph B. Dickey and James G. McNally (to Eastman Kodak Co.).

Alkylation of a phenolic compound containing at least one hydrogen atom attached to the aromatic nucleus which comprises reacting in the vapor phase the phenolic compound with a member of the group consisting of the saturated aliphatic alcohols and the saturated aliphatic ethers in the presence of a catalyst comprsiing an activated alumina. No. 2,448,942. De Loss E. Winkler and Robert H. Mortimer (to Shell Development Co.).

Diketo acrylates. No. 2,448,958. Albert M. Clifford (to Wingfoot Corp.).

Extraction of butadiene from a mixture of hydrocarbons containing both butadiene and butene by means of an ammoniacal cuprous acetate solution in which the ammoniacal cuprous acetate solution containing the dissolved butadiene and butene after it has contacted and has been separated from the said mixture of hydrocarbons is stripped of butene by passing in counter-current flow to the butadiene. No. 2,448,971. Richard A. Given and William S. Craft (to Standard Oil Development Co.).

Reacting acrylonitrile with water in the presence of an alkaline catalyst to produce a B,B' dicyano diethyl ether. No. 2,448,979. Heinrich Hopff and William Rapp (to Attorney General of U. S. A.).

Preparing N-isopropyl-methacryl-amide by mixing isopropyl alcohol with methacrylonitrile at an elevated temperature in the presence of an acid catalyst. No. 2,448,991. Joy G. Lichty (to Wingfoot Corp.).

3-(2'-methyl piperidino)-propyl-p-n butoxy benzoate and acid addition salts thereof. No. 2,448,996. Samuel M. McElvain and Thomas P. Carney.

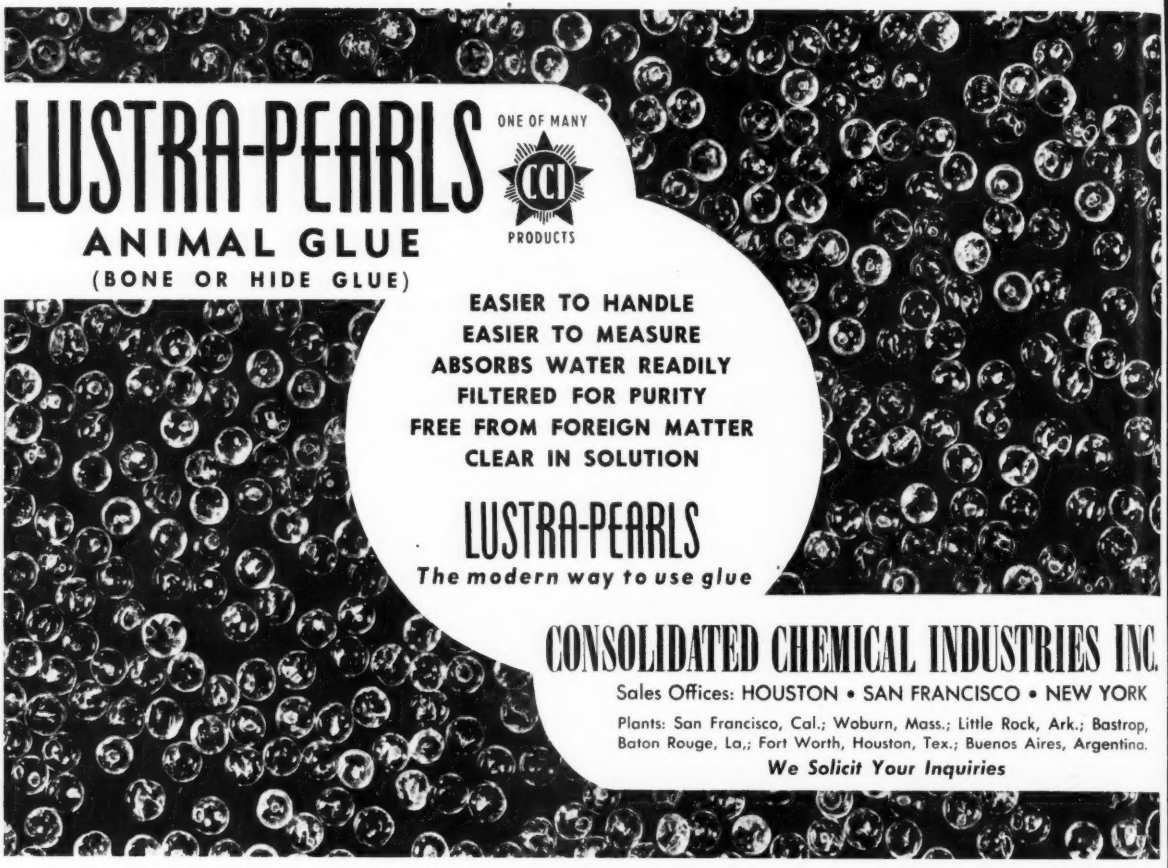
Piperidine propanol esters of phenylacetic acid. No. 2,448,997. Samuel M. McElvain and Thomas P. Carney.

3-(2',6'-dimethylpiperidino)-propyl salicylate and acid addition salts thereof. No. 2,448,998. Samuel M. McElvain and Thomas P. Carney.

Producing 1,3-diols by reacting an olefin with an aldehyde at elevated temperatures and pressures in the presence of sulfuric acid. No. 2,449,001. Louis A. Mikeska and Erving Arundale (to Standard Oil Development Co.).

Preparing polycarboxylic acid esters of riboflavin by heating riboflavin

*U. S. Patents from Vol. 613, Nos. 2, 3, 4, 5. Vol. 614, Nos. 1, 2. Canadian from Sept. 7-Oct. 5.



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U. S. Patents from Official Gazette—Vol. 614, Nos. 3, 4; Vol. 615, Nos. 1, 2, 3 (Sept. 21-Oct. 19)
Canadian Patents Granted and Published Oct. 12-Nov. 9

*Organic

Preparing a solution of a member of the group consisting of the organic peracids and their alkali forming salts which comprises reacting an alkyl ester of a carboxylic acid with an alkaline aqueous peroxide solution. No. 2,448,252. William R. Cornthwaite and Arthur A. Elston (to E. I. du Pont de Nemours & Co.).

Nitrile-producing process, the steps of maintaining two ammonia-fatty-acid reaction zones, passing fatty acids into the first of said zones, heating said acids in said zone to a liquid phase reaction temperature, contacting the same with ammonia vapors evolved from the second of said zones, passing high boiling fatty acid residue from said first zone to said second zone contacting the same in said second zone with ammonia vapors, and withdrawing the stripped high boiling residue as pitch from said second zone. No. 2,448,275. Ralph H. Potts (to Armour & Co.).

Activated carbon product consisting essentially of granular petroleum coke coated with a partially oxidized channel carbon black. No. 2,448,337. Leonard Wickenden.

Synthesis of organic carboxylic acids which comprises reacting an olefin hydrocarbon having from 2 to 10 carbon atoms with carbon monoxide and water in the presence of a metal carbonyl catalyst of the class consisting of nickel and cobalt carbonyls. No. 2,448,368. William F. Gresham and Richard E. Brooks (to E. I. du Pont de Nemours & Co.).

Sulfonating aromatic hydrocarbons in admixtures with aliphatic and alicyclic hydrocarbons which comprises mixing a hydrocarbon mixture with a sulfonating agent and an amount of acetonitrile sufficient to dissolve substantially all of said aromatic hydrocarbons and to hold substantially all of said sulfonating agent in solution. No. 2,448,370. Donald S. Henderson and Alexander N. Sachanen (to Socony-Vacuum Oil Co.).

Preparation of aliphatic carboxylic acids from steam, carbon monoxide and an olefinic hydrocarbon in the presence of a catalyst formed prior to the said reaction, said catalyst being a member of the class consisting of nickel carbonyl and cobalt carbonyl, in the presence of active carbon. No. 2,448,375. Alfred T. Larson (to E. I. du Pont de Nemours & Co.).

Para-([N]-dialkyl pyrryl) benzoates. No. 2,448,408. Souren Avakian (to The National Drug Co.).

Separating two aromatic hydrocarbons having the same number of double bonds per molecule which comprises passing through a body of silica gel, thereby selectively adsorbing one of said aromatic hydrocarbons. No. 2,448,489. Alfred E. Hirschler (to Sun Oil Co.).

Partially neutralizing an aqueous solution of aconitic acid with a basic inorganic compound and heating the resulting solution to decompose the aconitic acid into itaconic acid and carbon dioxide. No. 2,448,506. Joseph A. Ambler and Alfred Laurence Curl (to the U.S.A. by the Secretary of Agriculture).

In the chlorination of starch, the process comprising maintaining the starch immersed in liquid chlorine maintained under super-atmospheric pressure until chemical combination between the starch and chlorine has occurred, resulting in the evolution of hydrogen chloride. No. 2,448,510. Harold Nathan Barham (to Sharples Chemicals, Inc.).

Polyhydric alcohol ester of benzoic acid selected from the group which consists of those in which the carboxyl aryl group is linked directly by a single bond to an ethylenically bonded carbon and those in which the carboxy aryl group is linked to an ethylenically bonded carbon through a carbonyl group. No. 2,448,520. Martin E. Cupery (to E. I. du Pont de Nemours & Co.).

Separating dipentaerythritol from a mixture of pentaerythritol and dipentaerythritol. No. 2,448,566. Joseph A. Wyler (to Trojan Powder Co.).

Preparing glycidyl esters by reacting an anhydrous alkali metal salt of an acid selected from the group consisting of lauric, myristic, palmitic, stearic, oleic, riconoleic, linoleic, linolenic, butyric, abietic, elaidic, succinic and sebacic acids, with a molar excess of epichlorohydrin and a minor amount of a substance taken from the group consisting of oxides, hydroxides, and carbonates of alkali and alkaline earth metals under anhydrous conditions. No. 2,448,602. Ernest B. Kester and Henry M. Preusser (to the U. S. A. by the Secretary of Agriculture).

An alkylol amine salt of a saturated hydroxy higher fatty acid. No. 2,448,626. Benjamin B. Schaeffer (to U. S. A. by the Secretary of Agriculture).

Preparing ether acetals by reacting in the presence of a mercury catalyst and a strongly acidic catalyst a vinyl ester of a saturated monocarboxylic acid of 2 to 4 carbon atoms and an ether alcohol of the formula

$$R'(OR'')_xOH$$

wherein R' is a hydrocarbon group, R'' is an alkylene group of 2 to 3 carbon atoms, and x is an integer from 1 to 12. No. 2,448,660. Willard J. Croxall and Harry T. Neher (to Röhm & Haas Co.).

Compound conforming to the structural formula

$$R—CSS—NH_2R_1R_2$$

in which R is furyl, R_1 is selected from the group consisting of aliphatic and aromatic radicals and R_2 is selected from the group consisting of aliphatic radicals and hydrogen. No. 2,448,714. Albert F. Hardman (to Wingfoot Corp.).

Disubstituted barbituric acids wherein the substituents are in the 5-position, and wherein one of said substituents is a member selected from the class consisting of alkyl and alkenyl groups and the other is a member selected from the class consisting of 2-benzimidazole, 2-alkylbenzimadazole, and 2-alkenyl-benzimidazole groups. No. 2,448,722. Gustav J. Martin and Souren Avakian (to The National Drug Co.).

In the process of adding bromine to an unsaturated organic compound, the improvement which comprises intimately contacting said compound with bromine while at least one of said compound and said bromine is dissolved in liquid sulphur dioxide. No. 2,448,739. John Ross (to Colgate-Palmolive-Peet Co.).

Producing a 1,4 dicyano butene-2 which comprises reacting a 1,4 dihalo butene-2 of the group consisting of 1,4 dichloro butene-2 and 1,4 dibromo butene-2 with a copper cyanide to replace each of the halogen atoms in said dihalo butene-2 with a cyano group, said reaction being conducted under substantially non-aqueous conditions in the presence of a substantially non-aqueous non-polar liquid, said liquid being a solvent for said 1,4 dihalo butene-2 and unreactive with 1,4 dicyano butene-2, copper cyanide and the aforesaid dihalo butene-2. No. 2,448,755. Carl N. Zellner (to Tide Water Associated Oil Co.).

Method of introducing the hydroxyethyl radical into a substance of the group that consists of the phenols, the mercaptans, amines containing reactive hydrogen, the alcohols, and the carboxylic acids, which consists in reacting such substance with an ethylene ester of a group that consists of ethylene carbonate and ethylene sulfite. No. 2,448,767. Warner W. Carlson (to Mellon Institute of Industrial Research).

Adjusting an aqueous solution of a low-methoxyl pectinic acid to a pH not exceeding about 2 with a mineral acid thereby to precipitate the low-methoxyl pectinic acid, and separating the low-methoxyl pectinic acid from the acidified solution. No. 2,448,818. Rolland M. McCready, Harry S. Owens and William D. Maclay (to the U. S. A. by the Secretary of Agriculture).

Treating an aqueous suspension of an alkali earth aconitate with sulfuric acid in an amount less than chemically equivalent to the actions present in the aconitate to convert most of the aconitates to aconitic acid leaving present a small quantity of the aconitates, and heating to decompose the aconitic acid in the solution to itaconic acid and carbon dioxide in the presence of the aconitates. No. 2,448,831. Earl J. Roberts and Joseph A. Ambler and Alfred Laurence Curl (to the U. S. A. by the Secretary of Agriculture).

Continuously removing phthalic anhydride from vapors which comprises continuously cooling said vapors initially at a temperature varying between 130° and 450°C. down to a temperature between 50° and 95°C. by bringing said vapors into direct and intimate contact with a water spray whereby a major proportion of said phthalic anhydride is condensed and precipitated as anhydride from said vapors. No. 2,448,868. Walter M. Davis (to Monsanto Chemical Co.).

Trimethylenebenzomorpholine azo compounds. No. 2,448,869. Joseph B. Dickey and James G. McNally (to Eastman Kodak Co.).

Azo compounds containing a triazole nucleus. No. 2,448,870. Joseph B. Dickey and James G. McNally (to Eastman Kodak Co.).

Azo compounds containing a tetrahydroquinoline nucleus. No. 2,448,871. Joseph B. Dickey and James G. McNally (to Eastman Kodak Co.).

Alkylation of a phenolic compound containing at least one hydrogen atom attached to the aromatic nucleus which comprises reacting in the vapor phase the phenolic compound with a member of the group consisting of the saturated aliphatic alcohols and the saturated aliphatic ethers in the presence of a catalyst comprsiing an activated alumina. No. 2,448,942. De Loss E. Winkler and Robert H. Mortimer (to Shell Development Co.).

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**U. S. Patents from Vol. 613, Nos. 2, 3, 4, 5. Vol. 614, Nos. 1, 2. Canadian from Sept. 7-Oct. 5.*

and a polycarboxylic acid in phenol. No. 2,449,003. Anthony M. Moos and Sidney D. Upham (to American Cyanamid Co.).

Producing an alpha methyl styrene by contacting a mixture of an isopropyl benzene and steam with a dehydrogenation catalyst under dehydrogenating conditions of temperature and pressure the said catalyst consisting essentially of a major portion of magnesium oxide, a minor portion of iron oxide, a minor portion of copper oxide, and a minor portion of potassium oxide. No. 2,449,004. Charles E. Morrell and Ober C. Slotterbeck (to Standard Oil Development Co.).

Alkenoxy amino diphenylamines. No. 2,449,006. Robert P. Parker and John J. Denton (to American Cyanamid Co.).

Preparing a mono alpha acylamino dianthrimide acridone by subjecting an orthocarboxy alpha monoacylamino dianthrimide to ring closure in the presence of benzoyl chloride in an organic solvent and a minor amount of sulfuric acid with respect to the dianthrimide. No. 2,449,011. Mario Scalera and Asa W. Joyce (to American Cyanamid Co.).

Manufacture of hexamethylenediamine by liquid phase catalytic hydrogenation of adipic dinitrile which comprises subjecting the liquid adipic dinitrile to catalytic hydrogenation in the presence of a concentrated aqueous solution of a strong base. No. 2,449,036. Maximilien Grunfeld (to the Attorney General of the U. S.).

Preparation of 3-substituted benzotetronic acid and salts thereof. No. 2,449,038. Martin E. Hultquist (to American Cyanamid Co.).

Manufacture of hexamethylene tetramine which comprises introducing ammonia and formaldehyde into a rapidly moving aqueous solution containing hexamethylene tetramine. No. 2,449,040. Pierre Schideler and Charles Prescott Davis (to Chemical Construction Corp.).

Separation of monoethanol amine from admixtures by azeotropic distillation with chlorobenzene. No. 2,449,152. John C. Speck, Jr. (to U.S.A. as repres. by Secretary of the Navy).

Production of a coumarin by treating an ortho-hydroxy acylophenone in the presence of an alkali metal alcoholate and treating the product with acid to liberate said coumarin. No. 2,449,162. Haydn Geoffrey Dickenson (to Ward, Blenkinsop & Co., Ltd.).

Preparation of beta-halogenopropionic acids which comprises bringing the sole olefinic reactant, an olefinic compound of the formula $RCH{=}C(CH_3)CH_2X$ wherein X is a halogen selected from the 2nd and 3rd periods of the periodic table and R is selected from the class consisting of hydrogen and alkyls of 1-6 carbons under a carbon monoxide pressure of at least 200 atmospheres in contact, at 50-200°C., with a hydrated strong acid catalyst. No. 2,449,163. Thomas Aven Ford (to E. I. du Pont de Nemours & Co., Inc.).

Compounds of the general formula X-O·COOY wherein X is a radical of the group consisting of the sulfolanyl radicals and the sulfolenyl radicals, and Y is an alkenyl radical. No. 2,449,173. Rupert C. Morris and Edward C. Shokal (to Shell Development Co.).

N-phenylacetyl-α-amino-β, β-dimethylacrylic acid. No. 2,449,191. Otto K. Behernes (to Eli Lilly & Co.).

N-allyl-phenylacetamide. No. 2,449,192. Otto K. Behrens and Quentin F. Soper (to Eli Lilly & Co.).

N-(1,3-dihydroxy-2-propyl)-phenylacetamide. No. 2,449,194. Otto K. Behrens and Joseph W. Corse (to Eli Lilly & Co.).

Production of fluorochlorocyclopentenes having 8 halogen atoms, including a chlorine atom attached to each olefinic carbon, which comprises agitating hexachlorocyclopentadiene with a fluorinating agent of the group consisting of antimony pentafluoride and antimony pentafluorochloride having available fluorine. No. 2,449,233. Alexander D. Kischitz, Carl I. Gochenour and Robert E. Brailsford (to Hooker Electrochemical Co.).

2-(N-aryl-N-aralkyl-aminoalkyl)-imidazolines, the aminoalkyl group being a lower aminoalkyl group. No. 2,449,241. Karl Miescher and Willi Klarer (to Ciba Pharmaceutical Products Inc.).

Production of 1,3-dichloropropylene by mixing 1,2-dichloropropane with chlorine producing a reaction mixture containing 1,3-dichloropropylene. No. 2,449,286. Alasdair W. Fairbairn (to Shell Development Co.).

Hydrogen bromide-catalyzed oxidation of organic compounds. No. 2,449,347. William E. Vaughan and Frederick F. Rust (to Shell Development Co.).

Preparation of highly halogenated alkanes, by bringing into admixture, in the presence of a Friedel-Crafts catalyst, a halogenated methane containing at least 3 halogen atoms attached to the carbon, not more than one of the halogen atoms being a fluorine atom, and a halogenated ethylenic compound having at least one chlorine atom attached to one of the doubly bonded carbon atoms, said halogenated methane and said halogenated ethylenic compound being further characterized in that at least one of them contains at least one fluorine atom. No. 2,449,360. Paul Rolland Austin (to E. I. du Pont de Nemours & Co., Inc.).

Isolating vanillin from its aqueous solutions, comprising adsorbing it at a pH of between 5 and 9 on to an adsorption agent which is an anion exchange resin from m-phenylenediamine and formaldehyde and eluting therefrom by means of solvents. No. 2,449,364. Andre Blankart (to Hoffman-La Roche Inc.).

Cyclic process for separating aromatic hydrocarbons from a hydrocarbon mixture containing aromatic and non-aromatic hydrocarbons which comprises treating said mixture in liquid phase with activated carbon to preferentially adsorb aromatic hydrocarbons. No. 2,449,402. Moses Robert Lipkin and Alfred E. Hirschler (to Sun Oil Co.).

Carbamic esters of phenols containing a tertiary amino group and a substituted aryl group. No. 2,449,440. John A. Aeschlimann (to Hoffman-La Roche Inc.).

Preparation of an ester of a 3,4-dialkoxybutyric acid which comprises passing ketene into a 1,1,2-trialkoxyethane having no ketene reacting substituent containing an acid catalyst whereby an ester of a 3,4-dialkoxybutyric acid is formed, the 1,1,2-trialkoxyethane having the structural formula $ROCH_2CH(OR)_2$ in which R designates similar alkyl groups. No. 2,449,447. Richard E. Brooks (to E. I. du Pont de Nemours & Co., Inc.).

Synthesis of 1,1,2-trialkoxyethanes which comprises heating a dialkyl formal with carbon monoxide and hydrogen in the presence of an alkanol in the presence of a catalyst comprising a member of the class consisting of nickel and cobalt. No. 2,449,470. William F. Gresham and Richard E. Brooks (to E. I. du Pont de Nemours & Co., Inc.).

Preparation of a 3,3-dialkoxy propionic acid ester which comprises bubbling ketene vapors into a mixture of an alkyl ortho-formate and an acid catalyst, alkyl ortho-formate having the structural formula $(RO)_3CH$ in which R designates similar alkyl groups. No. 2,449,471. William F. Gresham (to E. I. du Pont de Nemours & Co.).

Reaction product of 3,5-diamino-4-hydro-thiotriazine-1-dioxide and an aldehyde. No. 2,449,520. Henry A. Walter (to Monsanto Chemical Co.).

Homopolymer of monovinylphenoxthine. No. 2,449,527. Ralph G. Flowers and Leola W. Flowers (to General Electric Co.).

Canadian

Recovering water insoluble primary aromatic amines from a mixture of the amine and iron sludge resulting from the reduction of the corresponding nitro compound with iron by adding a water soluble salt and a water immiscible, inert solvent for the amine. No. 451,026. John P. Goulding (to American Cyanamid Co.).

Purifying 2-aminothiazole by reacting 2-aminothiazole in aqueous solution with sulfurous acid, precipitating a solid bisulfite reaction product, recovering the product by filtration and transforming it into 2-aminothiazole. No. 451,028. Erwin Kuh and Warren B. Neier (to American Cyanamid Co.).

Producing dry acetylsulfanilyl chloride from an aqueous slurry by adding sufficient water immiscible inert organic liquid to the slurry to expel water out of the acetylsulfanilyl chloride, mechanically removing the major portion of the water and drying the cake. No. 451,029. Martin E. Hultquist (to American Cyanamid Co.).

Manufacture of acrolein oxime by reacting acrolein with a solution of hydroxylamine in the substantial absence of free, strong inorganic acids and isolating from the monomeric acroleinoxime having the formula $CH_2{=}CH{-}CH{=}NOH$. No. 451,058. Karl Heinrich Walter Tuerck and Hans Joachim Lichtenstein (to Distillers Co. Ltd.).

Production of styrene, halogen-substituted styrenes and homologues thereof by passing the vapour of a hydrocarbon selected from the class consisting of alkyl-substituted benzene hydrocarbons having an alkyl substituent group containing not less than 2 carbon atoms and halogen substitution products thereof in admixture with steam at an elevated temperature over a catalyst consisting of magnesium oxide impregnated with an oxide of vanadium, or with a compound which, under the reaction conditions, decomposes to an oxide of vanadium, and with an alkali metal compound, the said catalyst being substantially free from metals, whose oxides are readily reducible by hydrogen to the metals, and from compounds of such metals. No. 451,059. Herbert Muggleton Stanley, Francis Edward Salt and Thomas Weir (to Distillers Co.).

Purifying alkylolamides associated with other reaction products formed in reacting alkylolamines with fatty acids and their ésters and containing alkylolamides, and other basic substances of bitter flavor, which comprises treating the crude alkylolamide with an aqueous solution of a mineral acid material in a glyceride solvent to neutralize said basic substances and to precipitate the same as insoluble compounds. No. 451,075. Harland H. Young and David Rubinstein (to Indust'l Patents Corp.).

Recovering cysteine by hydrolyzing a material containing cystine with an aqueous solution of hydrochloric acid, adding a metal selected from the class consisting of zinc, iron and tin to reduce the cystine-containing hydrolysate in the resulting solution to cysteine hydrochloride, neutralizing acid remaining in said solution with a solid alkaline earth compound which is substantially insoluble in said solution, said alkaline earth compound beng selected from the class consisting of calcium carbonate, magnesium carbonate, and magnesium oxide, adding cuprous oxide to the solution to precipitate the cysteine hydrochloride as a mercaptide compound insoluble in said neutralized solution at low temperatures to free the same of soluble impurities, and adding hydrogen sulfide to said precipitate to convert said insoluble compound into cysteine hydrochloride. No. 451,076. Donald F. Holloway and Harland H. Young (to Indust'l Patents Corp.).

4-Pregnenone-20. No. 451,100. Russell Earl Marker and Eugene Leroy Wittle (to Parke, Davis & Co.).

Subjecting a glycosidic derivative of a pseudo-sapogenin unacylated at least at the exo-hydroxyl group and in the sugar residues to mild oxidation in the side chain attached to ring D thereby obtaining an oxidation product having an unacylated sugar residue attached to the steroid nucleus. No. 451,101. Russell Earl Marker and Eugene Leroy Wittle, Harry Means Crooks, Jr. (to Parke, Davis & Co.).

Preparation of a glycosidic derivative of an exo-dihydro-pseudo-sapogenin acylated at least at the exo-hydroxyl group and in the sugar residues which comprises catalytically hydrogenating a glycosidic derivative of a pseudo-sapogenin acylated at least at the exo-hydroxyl group and in the sugar residues. No. 451,102. Russell Earl Marker, Harry Means Crooks, Jr., and Eugene Leroy Wittle (to Parke, Davis & Co.).

Sapogenin Derivatives. No. 451,103. Russell Earl Marker, Harry Means Crooks, Jr., and Eugene Leroy Wittle (to Parke, Davis & Co.).

Halosteroids. No. 451,104. Russell Earl Marker, Harry Means Crooks, Jr. (to Parke, Davis & Co.).

Manufacture of a di-aryl carbonate by reacting phosgene with phenol containing as a promoting agent an amphoteric metal phenate. No. 451,171. Sager Tyron and William S. Benedict (to General Chemical Co.).

Preparing dicyandiamide by slurrying calcium cyanamide in the presence of carbon dioxide with an aqueous solution of guanidine, the reaction taking place in the absence of added ammonia. No. 451,174. John L. Osborne (to American Cyanamid Co.)

Azeotropic distillation of aniline by vapourizing aniline in the presence of water, condensing the vapours to liquids, separating the liquids by gravity separation at a sufficiently elevated temperature so that they separate into two sharp layers. No. 451,175. Henry Philip Orem (to American Cyanamid Co.).

Production of butadiene by exposing n-dichlorbutane to temperatures exceeding 500°C. No. 451,226. Martin Mueller Cunradi, Hans Krekeler, and Adolph Cantzler (to I. G. Farbenindustrie Aktiengesellschaft).

Separating a mixture comprising phenols and thiophenols, including the step of fractionally distilling said mixture in the presence of polar organic solvent and water under conditions to maintain liquid solvent in the residue of said distillation, whereby thiophenols and water pass overhead and phenols remain behind. No. 451,254. Daniel B. Luten, Jr. (to Shell Development Co.).

Separating an ortho-substituted conjugated ring compound from other substituted conjugated ring compounds in an associated mixture thereof having a relatively wide boiling range, said ortho compound and at least some of said other compounds having substantially identical boiling points at a given pressure and having a nucleus selected from the group consisting of benzene, pyridine, naphthalene, and quinoline, and containing a single polar group selected from the class consisting of $-NH_2$, $-COOH$, $-OH$, and $=N-$, the ortho positions to said polar group in said ortho compound being occupied by at least one non-polar hydrocarbon radical, while said other compounds are differently substituted, the steps comprising fractionally distilling said mixture under said given pressure to produce a fraction having a relatively narrow boiling range at said given pressure, said fraction containing at least a portion of said ortho and said some of said other compounds of substantially identical boiling points at said given pressure, and further fractionally distilling said fraction under a pressure substantially increased above said given pressure to produce an overhead and a bottom product, one of which is rich in said ortho-substituted compound and the other is rich in said some of said other compounds. No. 451,255. Daniel B. Luten, Jr., and Aldo de Benedictis (to Shell Development Co.).

Removing dissolved water from alkyl phenols containing it and water-soluble carboxylic acid salts comprising thoroughly contacting said alkyl phenols with water under conditions and separating from the mixture an alkyl phenol phase of substantially low water content than said starting alkyl phenols and an aqueous phase containing at least a part of said carboxylic acid salts. No. 451,256. Clifford T. Magin and Lloyd C. Fetterly (to Shell Development Co.).

Separating meta-xylene and para-xylene by completely sulphonating the xylene mixture, subjecting the completely sulphonated mixture to steam distillation to effect partial hydrolysis of the sulphonated mixture and form substantially pure meta-xylene as the primary distillation fraction, and cooling the residue from the steam distillation to precipitate directly therefrom substantially pure para-xylene sulphonic acid. No. 451,314. Percy J. Cole and Granville W. Burtt (to The Barrett Co.).

Purifying phthalic anhydride containing impurities which are not sulphur compounds by introducing an aqueous solution of nitric acid into the said phthalic anhydride in molten state so as to vaporize the nitric acid and contacting thus formed vapours of nitric acid with the said molten phthalic anhydride until substantial amounts of said impurities are converted into reaction products separable from the phthalic anhydride by distillation. No. 451,315. Frank Porter (to The Solvay Process Co.).

Subjecting poylstyrene resin to a pyrolysis temperature above 350°C, separating monomeric styrene. No. 451,317. Wilbert A. King (to Allied Chemical & Dye Corp.).

Removing toluene from p-toluene sulphonic acid which comprises subjecting molten p-toluene sulphonic acid containing toluene to steam distillation. No. 451,318. William B. Brown (to Allied Chemical & Dye Corp.).

Sulphonation of benzene by passing benzene vapour into sulphuric acid at about 85°C and 110°C, continuing passage of the vapour until the temperature of the mass rises to a peak at least 70°C above the initial temperature of the acid but not higher than about 180°C, and then completing the sulphonation at a temperature at least 5°C below the peak temperature. No. 451,319. James B. Maguire and David F. Gould (to Allied Chemical & Dye Corp.).

In a process for desulphurizing alkyl phenols containing aromatic mercaptans, the steps of treating said alkyl phenols in the liquid state with an amount of free sulphur and fractionally distilling the resulting product to produce a relatively small residue of high sulphur content, and a large distillated fraction having a reduced sulphur content, said amount of free sulphur being at least 10 per cent in excess of the stoichiometric amount required to react all of said mercaptans according to the equation: $2RSH + S \longrightarrow R_2S_3 + H_2S$. No. 451,377. Daniel B. Luten, Jr., and Aldo De Benedictis (to Shell Development Co.).

In a process of reacting an unsymmetrical unsaturated organic compound with hydrogen bromide, the improvement which comprises promoting and directionally controlling the reaction to effect abnormal hydrobromination by subjecting the reactants to the deliberate action of ultra-violet radiations of below 3000 Angstrom units. No. 451,378. William E. Vaughan and Frederick F. Rust (to Shell Development Co.).

Chlorination of unsaturated hydrocarbons by passing a vapourous stream comprising an unsaturated hydrocarbon containing an unsaturated linkage between two non-tertiary carbon atoms of aliphatic character into contact with finely divided solid particles comprising a carrier material and an effective amount of a metal chloride selected from the group consisting of cupric chloride and ferric chloride, imparting to the vapourous stream a velocity sufficient to maintain the solid particles in suspension therein, maintaining the reactants at an elevated temperature for a period of time sufficient to effect the chlorination, via addition, of the unsaturated hydrocarbons and the simultaneous reduction of the metal chloride to the lower state of valence. No. 451,379. Martin de Simo (to Shell Development Co.).

Preparing a cyclohexyl methyl carbinol by reacting methyl vinyl ketone with a conjugated diolefin in the vapour phase to form a cyclohexenyl methyl ketone, and hydrogenating the cyclohexenyl methyl ketone to a cyclohexyl methyl carbinol. No. 451,380. Rupert C. Morris and Theodore W. Evans (to Shell Development Co.).

Production of a 3,5-dialkyl phenol by subjecting a 3,5,5-trialkyl monocycloaliphatic ketone having six carbon atoms in the ring, in the vapour state and in the absence of a catalyst to a temperature of between about 575°C and about 750°C for a period of time less than about 30 seconds and separating the resulting 3,5 dialkyl phenol from the reaction mixture. No. 451,381. Paul H. Williams, Seaver A. Ballard, and Theodore W. Evans (to Shell Development Co.).

In a process for the recovery of purified methyl ethyl ketone the steps which comprise distilling the aqueous solution of methyl ethyl ketone together with a liquid aliphatic hydrocarbon so as to form a heterogenous ternary azeotrope comprising water, methyl ethyl ketone and the aliphatic hydrocarbon, extracting the ternary azeotrope with water, distilling the extractant and removing the water from the distillate. No. 451,393. Joseph E. Bludworth and Guiles Flower, Jr. (to Camille Dreyfus).

Production of sodium formate by reacting carbon monoxide gas with a solution of caustic soda which also contains sodium formate and simultaneously vapourizing water from the solution, thereby removing water from the solution in amount sufficient to crystallize sodium formate therefrom and form a slurry of sodium formate and insufficient to crystallize caustic soda from the solution. No. 451,425. Donald A. Rogers (to The Solvay Process Co.).

Continuous preparation of an ester of alpha methacrylic acid by continuously feeding an alcohol, water and the reaction zone of acetone cyanhydrin and oleum into a reaction zone. No. 451,444. Lawrence Timothy Jilk (to Canadian Industries Ltd.).

Production of a vinyl cyanide by reacting acetylene with hydrocyanic acid in the presence of a member of the group consisting of alkali metal and alkaline earth metal cyanides. No. 451,452. Charles Robert Harris and William Charles Sharples (to Canadian Industries Ltd.).

Production of a chlorinated aliphatic nitrile which comprises reacting an aliphatic nitrile taken from the group consisting of acetonitrile and propionitrile with a chlorinating agent taken from the group consisting of chlorine, phosgene, and sulphuryl chloride in the presence of a catalyst comprising a substance selected from the group consisting of silver, gold, platinum, palladium, and rhodium, and the oxides, hydroxides, and chlorides thereof. No. 451,457. James John Gray and Frank Burgess (to Canadian Industries Ltd.).

Manufacture of acyl cyanides containing from 2 to 10 carbon atoms per molecule by reacting hydrogen cyanide with a carboxylic acid anhydride in the vapour phase in the presence of a solid contact absorptive catalyst. No. 451,458. William Franklin Gresham (to Canadian Industries Ltd.).

Alk-SO_2NRCH$_2$CH$_2$CN wherein Alk is a lower alkyl and R is a member of the class consisting of hydrogen, lower alkyl, and betacyanoethyl radicals. No. 451,460. David Malcolm McQueen (to Canadian Industries Ltd.).

Nitronitriles of the formula $R_1R_2C(CN)\text{-}CHR_3NO_2$ **wherein** R_1, R_2 **and** R_3 **are selected** from the group consisting of hydrogen and lower alkyl radicals. No. 451,462. Gerard Dunstan Buckley and Royden Lewis Heath (to Canadian Industries Ltd.).

Monochlor trimethyl acetonitrile. No. 451,463. Oliver Wilfred Cass (to Canadian Industries Ltd.).

Production of an organic nitrile taken from the group consisting of acrylonitrile and succinontrile which comprises passing a gaseous mixture of HCN and ethylene oxide over a dehydration catalyst taken from the group consisting of the oxides of aluminum, thorium, silicon, vanadium, molybdenum, titanium, tungsten, and nickel. No. 451,464. Charles Roberts Harris (to Canadian Industries Ltd.).

Acylation of methyl lactate by reacting a vinyl ester with methyl lactate in the presence of a compound selected from the group consisting of alkali metal cyanides, silicates, carbonates, and tetraborates. No. 451,465. Virgil Leland Hansley (to Canadian Industries Ltd.).

Acylation of methyl lactate which comprises reacting a vinyl ester with methyl lactate in the presence of a tertiary amine of suitable alkalinity. No. 451,466. Virgil Leland Hansley (to Canadian Industries Ltd.).

Manufacture of butadiene from normal butane which comprises catalytically dehydrogenating normal butane to normal butene, separating, catalytically dehydrogenating to butadiene in a second stage dehydrogenation. No. 451,501. Karl H. Hachmuth (to Phillips Petroleum Co.).

Manufacture of phenols by preparing a solid mixture of a salt of the monosulphonic acid corresponding to the phenol desired and an inorganic base which is infusible at temperatures up to 420°C, and is capable of forming with sulphur dioxide a sulphite stable at such temperatures, and subjecting the solid mixture to a temperature ranging from 370-420°C while passing therethrough steam free from acidic gases. No. 451,581. Daniel Tyrer.

Manufacture of phenols or salts therefore by preparing an intimate solid mixture of an alkali metal salt of the sulphonic acid corresponding to the phenol desired, a caustic alkali and an additional particulate solid substance, which is substantially insoluble in fused caustic alkali, in such a proportion, that during the subsequent heating operation the reaction mixture does not froth or swell and remains in a substantially solid condition and then heating the said solid mixture at a temperature ranging from 350 to 400°C to cause the sulphonic acid salt and caustic alkali to undergo reaction. No. 451,582. Daniel Tyrer.

Manufacture of adrenaline mucate by reacting adrenaline with mucic acid. No. 451,596. Cyril Jack Eastland and David Owen Evans (to Allen and Hanburys Ltd.).

Method for continuously carrying out a fusion reaction between an aromatic sulphonate and an alkali metal hydroxide, which comprises introducing the reactant materials into a reaction zone and causing them to flow therethrough in a substantially horizontal direction, while agitating the fused reaction mixture in a direction substantially perpendicular to the direction of flow but avoiding substantial disturbance along the direction of flow, so that throughout any section of the reaction mixture taken in a direction at right angles to the direction of flow the reaction mixture is substantially homogeneous, but along the direction of flow the composition of the reaction mixture varies continuously from unreacted material. No. 451,598. John M. Harris, Jr. (to Allied Chemical and Dye Corp.).

Liquid composition comprising monomeric styrene and hematoxylin present in amount sufficient to inhibit polymerization of the monomeric material at atmospheric temperatures. No. 451,599. Edwin L. Cline (to Allied Chemical and Dye Corp.).

Making an olefine by passing a vaporous mixture of carbonyl compound capable of keto-enol tautomerism and an alcohol capable of dehydrogenation to a carbonyl compound, over a silica gel catalyst, and recovering an oleine from the reaction products. No. 451,621. William M. Quattlebaum, Jr., and Walter J. Toussaint (to Carbide and Carbon Chemicals Ltd.).

Manufacture of saturated and unsaturated derivatives of the cyclopentanopolyhydrophenanthrene series, comprising reducing free keto-groups in enol-derivatives of saturated and unsaturated polyketocyclopentanopolyhydrophenanthrenes. No. 451,624. Karl Miescher and Warner Fischer (to Society of Chemical Industry, Basle).

Amides of arylene thiazoles. No. 451,625. Ernst Henzi (to Society of Chemical Industry, Basle).

Manufacture of acetic acid by the oxidation of acetaldehyde by means of molecular oxygen characterized by generating the acetaldehyde in situ by treating paraldehyde in a reaction vessel with a depolymerising agent therefore at a temperature below 80°C passing a gas containing molecular oxygen through said paraldehyde to oxidize the formed acetaldehyde therein and controlling the rate of depolymerization by correspondingly adjusting the depolymerizing temperature the acidic strength of the depolymerizing agent and the concentration of the latter so that acetaldehyde is forced at a rate not substantially in excess of the rate of oxidation thereof. No. 451,628. Hanns Peter Staudinger, Karl Heinrich, Walter Tuerck, and Eric Harvey Brittain (to The Distillers Company Ltd.).

Separating alpha-acetylenes from hydrocarbon mixtures containing the same in admixture with conjugated diolefines each having less than 6 carbon atoms in the molecule, which comprises scrubbing the hydrocarbon mixture with a volume of water sufficient substantially to dissolve the alpha-acetylenes, and separating the residual hydrocarbons from the aqueous extract. No. 451,633. Lee H. Horsley and Howard S. Nutting (to The Dow Chemical Co.).

Preparing alkylated carbocyclic compounds comprising contacting carbocyclic compounds susceptible to alkylation in admixture with a compound selected from the group consisting of alkyl mercaptans and alkyl sulphides with copper pyrophosphate. No. 451,681. Carlisle M. Thacker and Richmond T. Bell (to The Pure Oil Co.).

Manufacture of piperidine derivatives, which comprises heating a mixture of a 4-arylpiperidine-4-nitrile, an alcohol, sulphuric acid and water. No. 451,689. Franz Bergel, Nathan Chadwick Hindley, Alexander Lang Morrison, and Heinrich Rinderknecht (to Roche Products Ltd.).

Water-soluble salts of iodo-phenoxy aliphatic sulphonic acid compounds. No. 451,731. William Hiemenz and Louis Freedman (to Winthrop Chemical Co., Inc.).

*Paper, Pulp

Improving the chemical reactivity and adsorptive capacity of lignin from wood saccharification comprising digesting such lignin with a solution of an alkali hydroxide and thereafter separating the treated lignin from the alkali hydroxide. No. 2,449,209. Eduard Farber and Mathew Sciascia (to Timber Engineering Co.).

Canadian

Bleaching an aqueous suspension of groundwood pulp by adding zinc hydrosulphite. No. 451,225. Howard J. Cronin (to International Paper Co.).

*Petroleum

Catalytic conversion of hydrocarbons with a thorium phosphate catalyst. No. 2,446,547. George Alexander Mills (to Houdry Process Corp.).

**U. S. Patents from Vol. 613, Nos. 2, 3, 4, 5. Vol. 614, Nos. 1, 2. Canadian from Sept. 7-Oct. 5.*

Converting heavy hydrocarbon oils into lower boiling products by forming a fine suspension of molybdenum oxydihydroxydichloride in a heavy hydrocarbon oil and heating and subjecting to destructive hydrogenation conditions. No. 2,446,602. Joseph B. McKinley and Harry J. Elder (to Gulf Research & Development Co.).

Polymerization of olefins in the presence of hydrogen by contact in vapor phase with a solid adsorptive polymerization catalyst. No. 2,446,619. Meredith M. Stewart and Frank J. Moore (to Texas Co.).

Refining oil by contacting with an active hydrated alumina adsorbent. No. 2,446,799. Charles C. Winding (to Tide Water Associated Oil Co.).

Cracking of hydrocarbons with suspended catalyst. No. 2,446,925. Charles E. Hemminger (to Standard Oil Development Co.).

Thickened lubricant comprising in combination a hydrocarbon oil, a polymer in solution and a curing agent. No. 2,446,927. Harris D. Hineline (to Standard Oil Development Co.).

Vaporizing apparatus for liquefied gases. No. 2,446,941. James Woodward Martin (to Lone Star Gas Co.).

High capillarity lubricating oil. No. 2,446,944. John D. Morgan (to Cities Service Oil Co.).

Isobutene trimer by contacting isobutene by monomer with sulfuric acid. No. 2,446,947. John C. Munday and Robert V. J. McGee (to Standard Oil Development Co.).

Inhibition of diolefin polymer growth. No. 2,446,969. Lester Marshall and Samel B. Lippincott (to Standard Oil Development Co.).

Catalytically treating hydrocarbons with hydrogen fluoride and boron trifluoride in the presence of hydrogen. No. 2,446,998. Robert E. Burk (to Standard Oil Co.).

Catalytic reforming of hydrocarbons by contacting with a catalyst composition of zinc aluminate spinel supporting a metal ozide. No. 2,447,016. Kenneth K. Kearby (to Standard Oil Development Co.).

Hydroforming process with a metallic oxide catalyst. No. 2,447,043. Albert B. Welty, Jr., and Clinton H. Holder (to Standard Oil Development Co.).

Removing acidic sulfur compounds from hydrocarbon distillates with aqueous caustic. No. 2,447,051. Donald C. Bond and Nelson B. Russell (to The Pure Oil Co.).

Vacuum stripping of moving catalyst in hydrocarbon conversion process. No. 2,447,116. Robert B. Collins (to Universal Oil Products Co.).

Catalytic conversion of hydrocarbons. No. 2,447,149. Lloyd D. Wier (to Standard Oil Development Co.).

Self-dispersing concentrate for forming stable oil-in-water emulsions. No. 2,447,475. Russell A. Kaberg and John Sterling Harris (to Monsanto Chemical Co.).

Hydraulic and lubricating fluid composition comprising essentially a silicone fluid and from about 0.1% to about 2.0% by weight of a corrosion inhibiting compound selected from the group consisting of fatty acids, chloroaryl substituted fatty acids, alkaryl substituted fatty acids and hydroaryl substituted fatty acids wherein the fatty acid chain contains from about 10 to about 18 carbon atoms. No. 2,447,483. Hayward R. Baker and William A. Zisman (to the U. S. A. by the Secretary of the Navy).

Hydrocarbon synthesis with fluidized catalyst regeneration. No. 2,447,505. Everett A. Johnson (to Standard Oil Co.).

Process for removing acidic impurities from a hydrocarbon oil. No. 2,447,529. Roderick B. Perkins, Jr. (to Petrolite Corp., Ltd.).

Removing from a hydrocarbon oil, impurities capable of reacting with an acid to form reaction products. No. 2,447,530. Roderick B. Perkins, Jr. (to Petrolite Corp., Ltd.).

Improved lubricating oil composition consisting of a mineral lubricating oil containing from 0.5 to 5.0% by weight based on the total composition of an alkaline earth metallo-organic detergent composition and an oil soluble hydrophilic agent selected from the group which consists of phenoxy ethanol and phenoxy isopropanol. No. 2,447,607. John C. Zimmer and Gordon W. Duncan (to Standard Oil Development).

Preparing a solid, water-insoluble cation exchange material by heating sulfuric acid which has previously been used as a catalyst in the alkylation of isobutane with butylene and which contains at least 10% of sulfuric acid-soluble hydrocarbon polymer until gelation occurs, and for a period of time thereafter sufficient to insure substantial completion of the reaction between the acid and the hydrocarbon. No. 2,447,762. Stephen J. Macuga, Frank G. Ciapetta and Randall G. Heiligmann (to The Atlantic Refining Co.).

Gasoline containing a compound of the formula, $(R)_3\ Pb—R'—Pb—(R)_3$ wherein R is an alkly radical selected from the group consisting of methyl and ethyl and R' is an alkylene radical selected from the group consisting of methylene and ethylene. No. 2,447,926. Sol B. Wiczer.

Catalytically cracking hydrocarbons by treating kerosene with a liquid catalyst which comprises 89% hydrogen fluoride (based on the kerosene) promoted by an amount of boron trifluoride. No. 2,448,015. Robert E. Burk (to The Standard Oil Co.).

Lubricant comprising oil and an oil soluble neutralized organic corboxylic acid bearing a thiocarbonate radicle. No. 2,448,037. Bert H. Lincoln and Gordon D. Byrkit (to The Lubri-Zol Development Corp.).

Process wherein contaminated catalyst is removed from said body and a stream of gaseous reaction products regenerated by burning combustible contaminants therefrom. No. 2,448,135. Bernard M. Becker and Jerry McAfee (to Universal Oil Products Co.).

Process for converting hydrocarbon gases. No. 2,448,257. Louis P. Evans (to Socony-Vacuum Oil Co.).

Hydrogenating carbon oxides by continuously flowing a gaseous mixture comprising hydrogen and a carbon oxide upwardly in a reaction zone through a mass of finely divided contact material comprising a catalyst for the reaction. No. 2,448,279. Louis C. Rubin (to The M. W. Kellogg Co.).

Production of a mixture of carbon monoxide and hydrogen wherein a gaseous hydrocarbon and a gas selected from the group consisting of steam and carbon dioxide are reacted by passing a preheated stream of said reactants through a reaction zone in contact with a solid catalyst. No. 2,448,290. Harold V. Atwell (to The Texas Co.).

Pyrolytic conversion of hydrocarbons in vapor phase in intimate contact with a solid catalyst at an elevated temperature. No. 2,448,334. Kenneth Merle Watson (to Sinclair Refining Co.).

Process of alkylation comprising reacting an isoparaffin and an olefin in the presence of a complex hydrofluoric acid catalyst. No. 2,448,400. Emory M. Skinner (to Socony-Vacuum Oil Co., Inc.).

Separating a liquid hydrocarbon mixture comprising two naphthene hydrocarbons which differ by not more than three carbon atoms per molecule by treatment in liquid phase with silica gel, thereby selectively adsorbing one of said hydrocarbons. No. 2,448,488. Alfred E. Hirschler (to Sun Oil Co.).

Apparatus for catalytic conversion of hydrocarbon vapors. No. 2,448,549. Carl S. Reed and August Henry Schutte (to the Lummus Co.).

Method of continuously carrying out a catalytic hydrocarbon reaction. No. 2,448,550. Carl S. Reed and August Henry Schutte (to The Lummus Co.).

Process for recycling catalyst fines in a catalyst conversion system. No. 2,448,553. August Henry Schutte and Carl S. Reed (to The Lummus Co.).

Lubricant comprising a branched-chain alkyl di-ester of a carboxylic acid having from 5 to 12 carbon atoms blended with a soap to produce a stable grease. No. 2,448,567. William A. Zisman and George M. Hain.

Recovery of hydrogen fluoride by distillation in the alkylation of low-boiling pafaffins and olefins in the presence of hydrogen fluoride as the catalyst. No. 2,448,620. George R. Reading and Roy E. Vinyard (to Phillips Petroleum Co.).

Preferential alkylation of cyclic hydrocarbons on methylene and alkyl groups alpha to a ring double bond which comprises bringing into contact in a reaction zone an alkali metal catalyst, a monoolefin hydrocarbon and a cyclic hydrocarbon having at least two hydrogens on a carbon atom which is directly attached by a single bond to a nuclear carbon atom which in turn is attached by a double bond to another nuclear carbon atom, and selected from the class consisting of aromatic and hydroaromatic hydrocarbons. No. 2,448,641. Gerald M. Whitman (to E. I. du Pont de Nemours & Co.).

Continuous process for upgrading the heating value of a natural gas containing noncombustible nitrogen gas comprising the steps of contacting said natural gas with liquid sulfur dioxide at superatmospheric pressure and at substantially atmospheric temperature whereby the nitrogen passes into the liquid sulfur dioxide and some sulfur dioxide vaporizes into the natural gas, separating the liquid sulfur dioxide from the natural gas containing vaporous sulfur dioxide, separating the nitrogen and removing the nitrogen as a secondary product of the process, and recycling the latter sulfur dioxide; contacting the so treated natural gas containing sulfur dioxide vapors with diethylene triamine at essentially atmospheric temperature and at superatmospheric pressure wherein the sulfur dioxide vapors become absorbed in the diethylene triamine. No. 2,448,719. John W. Latchum, Jr. (to Phillips Petroleum Co.).

Lubricating grease comprising mineral oil, an aluminum soap of a saturated higher fatty acid and a barium soap of a higher fatty acid. No. 2,448,720. Francis J. Licata (to Nopco Chemical Co.).

Lubricating grease comprising mineral oil, an aluminum soap of a saturated higher fatty acid and a heavy metal soap selected from the group consisting of iron, cobalt, nickel, zinc and copper soaps of higher fatty acids. No. 2,448,721. Francis J. Licata (to Nopco Chemical Co.).

Conducting a high temperature vapor-phase cracking of hydrocarbons in the presence of steam. No. 2,448,922. Thomas P. Simpson and Sylvander C. Eastwood (to Socony-Vacuum Oil Co.).

Stabilizing hydrocarbons with a small amount of a phenolic type antioxidant. No. 2,449,010. Richard F. Robey, John Fedirko and Allan E. Barnett (to Standard Oil Development Co.).

In the method of treating acid refined petroleum oils, the improvement which comprises treating said acid refined oils with a finely divided porous adsorptive clay-type inorganic material carrying an outer layer deposit of not less than 2½% of activated carbon. No. 2,449,016. Thomas P. Simpson, John W. Payne and Peter D. Valas (to Socony-Vacuum Oil Co., Inc.).

Conversion of hydrocarbon oils. No. 2,449,027. Alexis Voorhies, Jr. (to Standard Oil Development Co.).

Subjecting a hydrocarbon oil under catalytic cracking conditions to contact with cerium phosphate as the principal catalytically active component. No. 2,449,050. George R. Bond, Jr., and George Alexander Mills (to Houdry Process Corp.).

In refining petroleum hydrocarbons, the improvement which comprises subjecting a mass of particled hydrocarbon petroleum refining mineral adsorbent to vibration for a period sufficient to obtain an over-all volume reduction of said mass of said adsorbent of at least 5% and thereafter filtering a petroleum hydrocarbon in liquid phase through the said volume reduced adsorbent thus vibrated. No. 2,449,051. Ferdinand W. Breth and Anthony Kinsel (to L. Sonneborn Sons, Inc.).

Converting higher boiling hydrocarbon to lower boiling products by subjecting to cracking conditions in the presence of a catalyst comprising alumina to which has been added a separately formed metal oxyfluoride of the group consisting of beryllium oxyfluoride, titanium oxyfluoride, and zirconium oxyfluoride, as the essential and primary promoter. No. 2,449,061. Samuel M. Darling (to Standard Oil Co.).

Catalyst for the synthesis of liquid and solid hydrocarbons from hydrogen and carbon monoxide consisting essentially of the reduction products of a mixture of precipitated ferric oxides in which from 1-60% by weight is in the metal form, the balance of said oxides being essentially in the ortho form. No. 2,449,071. Charles O. Hawk, Norma B. Stern, and Lawrence J. E. Hofer (to U. S. A. as repres. by Secretary of the Interior).

Making oils from acid sludges resulting from the sulfuric acid purification of coal tar distillates. No. 2,449,098. Harry L. Allen and George J. Skriver (to Allied Chemical & Dye Corp.).

Lubricating compound comprising colloidal graphite dispersed in a halogenated hydrocarbon solvent for grease consisting of a mixture of ethyl chloride with dichloro-monofluoro-methane. No. 2,449,114. Charles L. Gebauer (to Gebauer Chemical Co.).

Block grease composition consisting of mineral oil, alkali metal soaps, monohydric alcohols of at least 14 carbon atoms and glycerine. No. 2,449,312. George W. Murray and Chester D. Thayer (to Socony-Vacuum Oil Co., Inc.).

Producing acid-free tar from an emulsified acid tar derived by hydrolyzing in the presence of water and steam an acid sludge resulting from the treatment with sulfuric acid of a petroleum stock. No. 2,449,404. Robert J. Miller (to Calif. Research Corp.).

Hydrocarbon conversion process with liquid hydrogen fluoride. No. 2,449,463. Bernard L. Evering and Arthur P. Lien (to Standard Oil Co.).

Lubricant comprising, in combination, a polymeric silicon oxide having oily characteristics, and a finely divided solid compound selected from the class consisting of the disulfides, selenides and tellurides of molybdenum, tungsten, and titanium. No. 2,449,510. Billy P. Robertson (to Westinghouse Electric Corp.).

Canadian

Producing gasoline by cracking hydrocarbon oil by admixing the oil to be cracked with an undried hydrous silica prepared from a metal silicate solution and containing imbibed water and having mixed therewith an active oxide cracking catalyst, passing the mixture of hydrocarbon oil and hydrous silica oxide mixture through a cracking zone. No. 451,012. Reginald K. Stratford.

Dehydrogenating hydrocarbons by contacting with a dehydrogenating catalyst in the presence of not less than 0.1% by volume of mercury vapor. No. 451,109. Carlisle M. Thacker and Richmond T. Bell (to The Pure Oil Co.).

Reforming naphtha by contacting with a catalyst consisting of aluminum oxide and an alkali metal borate. No. 451,178. Ernest M. Marks (to The Atlantic Refining Co.).

Conversion of hydrocarbons of high boiling point into those of lower boiling point by subjecting to cracking conditions in the presence of sulphur dioxide and in the absence of water or water vapours introduced from an extraneous source. No. 451,179. Oscar L. Roberts (to The Atlantic Refining Co.).

Reacting a feed containing substantially only normal butane at a temperature of about 942° F for about 11 seconds in contact with bauxite to thereby produce isobutylene. No. 451,257. Kenneth C. Laughlin (to Standard Oil Development Co.).

Treatment of Hydrocarbons. No. 451,376. Han Hoog (to Shell Development Co.).

In the manufacture of gasoline of high antiknock value the improvement which comprises mixing a small proportion of a finely-divided argillaceous material with a petroleum stock produced by thermal cracking without catalysis. No. 451,382. E. C. Herthel (to Sinclair Refining Co.).

In the alkylation of isoparaffins with olefine employing a catalyst comprising the brown mobile liquid formed by contacting aluminum chloride with the isoparaffin and olefin, the improvement which comprises contacting the isoparaffin and olefin under operating conditions with said hydrocarbon complex containing the maximum amount of aluminum chloride which is soluble in said complex. No. 451,385. Ralph M. Hill (to Standard Oil Development Co.).

Breaking petroleum oil field emulsions of the water-in-oil type by subjecting the emulsion to the action of ultrasonic vibrations. No. 451,426. Robert Bowling Barnes (to American Cyanamid Co.).

Process for the catalytic dehydrogenation of low molecular weight hydrocarbons by passing said hydrocarbons over a catalyst comprising a major proportion of magnesium oxide, a minor proportion of manganese dioxide and a small amount of copper oxide. No. 451,516. Kenneth K. Kearby (to Standard Oil Development Co.).

Catalytic dehydrogenation of low molecular weight hydrocarbons by diluting with steam and passing the mixture over a catalyst comprising a major proportion of magnesium oxide and minor proportions of chromium oxide and potassium oxide. No. 451,517. Kenneth K. Kearby (to Standard Oil Development Co.).

Improved process for the catalytic dehydrogenation of low molecular weight hydrocarbons which comprises passing said hydrocarbons at a temperature between 1000 and 1600° °F over a catalyst comprising a major proportion of aluminum oxide, a minor proportion of vanadium oxide and a small amount of silver. No. 451,692. Walter R. F. Guyer (to Standard Oil Development Co.).

Inhibiting cracking of polymeric bodies comprising slowly heating said body and slowly cooling said heated body to room temperature. No. 451,707. William O. Baker (to Bell Telephone Labs., Inc., and Western Electric Co., Inc.).

*Photographic

Photographic emulsions sensitized with salts of metals of group VIII of the periodic arrangement of the elements. No. 2,448,060. William F. Smith and Adrian P. H. Trivelli (to Eastman Kodak Co.).

Photographic element comprising a support which transmits actinic light, a light-sensitive colloid silver halide emulsion layer on one surface of said support and on the other surface of said support, in order, a clear layer composed of water-insoluble vinylpyridine polymer which is soluble in 1% aqueous acetic acid and contains an antihalation material, an an antiabrasion layer composed of a water-soluble film-forming material. No. 2,448,507. Francis Peter Alles (to E. I. du Pont de Nemours & Co.).

Photographic element comprising a support which transmits light rays, a light-sensitive silver halide emulsion layer on one side of the support, a sublayer on the opposite side of the support consisting of a water-insoluble vinylpyridine polymer which is soluble in 1% aqueous acetic acid which carries a water-permeable colloid layer containing a dischargeable dye which absorbs light of wave lengths to which the emulsion is sensitive. No. 2,448,508. Francis Peter Alles (to E. I. du Pont de Nemours & Co.).

Photographic element comprising a support, a water-insoluble film-forming vinylpryridine polymer sublayer on said support, a synthetic hydroxyl polymer intermediate layer on said support, containing a soluble boron compound capable of yielding borate ions on said sublayer and a gelled synthetic hydroxyl polymer silver halide emulsion layer on said intermediate layer said hydroxyl polymer containing a plurality of recurring intralinear

$$-CH_2-\underset{|}{C}HOH$$

groups. No. 2,448,525. Charles F. Glick (to E. I. du Pont de Nemours & Co.).

Photographic silver halide emulsion in which the silver halide is dispersed in a hydrolyzed cellulose carboxylic ester, said emulsion containing ethylene diamine. No. 2,448,534. Wesley G. Lowe and Raife G. Tarkington (to Eastman Kodak Co.).

Photographic element comprising a support which transmits light, a light-sensitive layer on one side of said support and an antihalation layer on the other side of the support comprising a water-insoluble vinylpyridine polymer which is soluble in 1% aqueous acetic acid and an antihalation material. No. 2,448,542. David Malcolm McQueen and Clay Weaver (to E. I. du Pont de Nemours & Co.).

Photographic element comprising a support, a light-sensitive hydrophilic silver halide colloid layer on said support, and a water-insoluble vinylpyridine polymer layer which is soluble in 1% aqueous acetic acid and is in adhesive contact with the colloid layer. No. 2,448,552. Ferdinand Schulze (to E. I. du Pont de Nemours & Co.).

Paper planographic printing plate impregnated with 2 amino, 2 methyl, 1,3 propanediol. No. 2,448,749. Charles H. Van Dusen, Jr. (to Addressograph-Multigraph Corp.).

Rapid process for the formation of an image in a hardened silver halide photographic layer which comprises exposing said layer, developing it with a silver halide developing agent and stabilizing it in the presence of a metal below silver and above osmium in the electromotive series, with an alkali metal thiocyanate, only until the unexposed silver halide is substantially completely converted to a light-inert silver complex by reacting with the stabilizing material and drying. No. 2,448,857. William L. Brice (to Eastman Kodak Co.).

Photographic silver halide emulsion sensitized with a supersensitizing combination of at least one oxonol dye and, as a supersensitizer for the oxonol dye, at least one basic dye selected from the group consisting of monomethine cyanine dyes, trimethine cyanine dyes, dimethine hemicyanine dyes and styryl dyes. No. 2,448,858. Burt H. Carrol and Cyril J. Staud (to Eastman Kodak Co.).

Producing a colored photographic image in a silver halide emulsion layer which comprises incorporating in said layer a metallic salt of

*U. S. Patents from Vol. 613, Nos. 2, 3, 4, 5. Vol. 614, Nos. 1, 2. Canadian from Sept. 7-Oct. 5.

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a coupler compound having the formula:

$$R''—NH—CO—CRR'—SX$$

where R" is selected from the class consisting of 2-hydroxy mononuclear aryl radicals, 5-hydroxynaphthyl radicals, 1-benzoyl acetanilido radicals, acetoacetylanilido radicals, omega-cyano acetphenone radicals, and 3-(1-phenyl-5-pyrazolone) radicals, R and R' are selected from the class consisting of hydrogen and alkyl groups and x is selected from the class consisting of hydrogen and acetyl groups, exposing said layer and developing it with a primary aromatic amino developing agent. No. 2,448,939. Arnold Weissberger, Charles J. Kibler and Richard V. Young (to Eastman Kodak Co.).

Photographic silver-bromide emulsion containing cysteine. No. 2,449,153. Franz Urbach.

7-amino and 7-hydroxy-1,3,4-triazaindolizines as stabilizers for photographic silver-halide emulsions. No. 2,449,225. Newton Heimbach and Walter Kelly, Jr. (to General Aniline & Film Corp.).

2-(Vinyl-dicarboxylic acid ester)-3-amino-1,2,4-triazoles as stabilizers for photographic silver-halide emulsions. No. 2,449,226. Newton Heimbach and Walter Kelly, Jr. (to General Aniline & Film Corp.).

Thioindoxyl couplers for color photography. No. 2,449,244. Fritz W. H. Mueller and Abraham Bavley (to General Aniline & Film Corp.).

Process of color photography which includes the step of forming a colored image in a photographic emulsion layer carrying an image in a reducible silver salt by developing such image, in the presence of a caustic alkali and at a temperature of at least 20° C. by means of a compound of the general formula R—NH—N=CH—CO—NH where R is an aromatic nucleus and thereafter removing residual silver and silver salts from the layer. No. 2,449,388. John David Kendall and Harold Gordon Suggat (to Ilford, Ltd.).

Canadian

Producing a photoprinting material by coating a solution of a light-sensitive N-nitroso-N-arylamide onto a suitable carrier and drying. No. 451,064. Donald Edward Sargent (to General Aniline & Film Corp.).

Storage-stable dry mix for use in producing electrolytic recording solutions containing as its essential components a source of diazonium ions capable of yielding a diazonium compound under the influence of an electrolytic recording current, a water soluble inorganic salt as the electrolyte in an amount to insure passage of the electrolytic recording current through such solution, a sufficient quantity of a naphthol sulphonic acid, a sulphonic acid group of which has been neutralized by morpholine to couple with the diazonium compound when formed to produce an azo dye. No. 451,249. Harold G. Greig (to Radio Corp. of America).

Producing colored images on a relatively stable background on only one side of a fibrous traveling carrier by the electrolytic facsimile recording method which comprises impregnating the carrier with an aqueous alkaline azo dye-forming composition comprising as its essential components a diazoamino compound stable to light and air oxidation in an alkaline medium and splitting under the influence of the electrolytic recording current to yield diazonium ions, said compound being an aromatic diazonium compound stabilized with an alkylolamine in which the stabilizing amine is an aliphatic amine, a water-soluble inorganic salt as the electrolyte in an amount sufficient to facilitate the passage of the electrolytic recording current, and a sufficient quantity of a coupling component to react with said diazonium ions when formed to produce an azo dye and subjecting the so treated carrier to the action of an electrolytic recording current. No. 451,250. Harold G. Greig (to Radio Corp. of America).

Producing multicolor photographs by photographing a member selected from the group consisting of black and white and monochrome drawings on a photographic film, processing the exposed film into a negative and coloring the lines and areas of the resulting negative with an aqueous solution comprising a water soluble dye and a complex sodium borophosphate, printing the resulting colored negative on a photographic multilayer element in which each layer is sensitized to one of the primary colors of light and contains a color forming compound, and processing the exposed photographic multilayer element into a multicolor photograph. No. 451,351. Richard M. Haff (General Aniline & Film Corp.).

Producing multicolor photographs by photographing a member selected from the group consisting of black and white, and monochrome drawings on a photographic film, processing the exposed film into a negative and coloring the lines and areas of the resulting negative with an aqueous solution containing a water soluble dye, a hydrophilic polymer, a water soluble aliphatic polyhydric alcohol of at least two carbon atoms and a wetting agent, printing the resulting colored negative on a photographic multilayer element in which each layer is sensitized to one of the primary colors of light and contains a color forming compound, and processing the exposed photographic multilayer element into a multicolor photograph. No. 451,352. Harold C. Harsh, Richard M. Haff and Frank J. Kaszuba (to General Aniline & Film Corp.).

In a process of preparing light-sensitive silver halide emulsions for coating photographic layers, the step which comprises condensing a polyfunctional condensation agent taken from the class consisting of aldehydes and dimethylol derivatives of amides and ureas and ethers of such dimethylol derivatives with a color former having as an active coupling group a structure of the general formula

$$X—(\overset{|}{C}=\overset{|}{C})_n—\overset{|}{C}=\overset{|}{C}H$$

where X is a member taken from the group consisting of hydroxyl and primary and secondary amine radicals and n is a number taken from the group consisting of 0 and 1 and a hydrophilic aliphatic film-forming hydroxyl polymer containing more than 200 carbon atoms and at least one hydroxyl group for each 8 carbon atoms, by causing said three components to interact in a solution of said polymer which has light-sensitive silver halide grains intimately dispersed therethrough. No. 451,459. Andrew Bradshaw Jennings (Canadian Industries, Ltd.).

*Polymers

Treatment of styrene-isobutylene polymer films. No. 2,446,536. Paul E. Hardy (to Standard Oil Development Co.).

Extraction of nitrocellulose from nitrating solution with a normally liquid nitro paraffin. No. 2,446,541. Edward E. Litkenhous (to Tennessee Products Corp.).

Urea-formaldehyde composition comprising a urea-formaldehyde reaction product and a potentially acid substance consisting of the guanidine salt of a mono-sulfonic acid of a hydrocarbon of the benzene series. No. 2,446,867. David E. Cordier (to Libbey-Owens-Ford Glass Co.).

Polymerizing olefinic compounds with metal halide-organic acid double salts. No. 2,446,897. David W. Young and Henry B. Kellog (to Standard Oil Development Co.).

Stabilization of vinyl resins. No. 2,446,976. Edward Cousins (to Wingfoot Corp.)

Thermosetting vinyl chloride-containing plastics. No. 2,446,984. Thomas H. Rogers, Jr., and Robert D. Vickers (to Wingfoot Corp.).

Melamine-formaldehyde resins plasticized with alkali lactate. No. 2,446,991. James Ranald Alexander, Donald Burton and Frederick Hausmann (to William Walker & Sons, Ltd.).

Sulfo compositions—hard, dense, amorphous, infusible, insoluble substance composed of carbon, hydrogen and sulfur. No. 2,447,004. Bernard W. Gamson (to Great Lakes Carbon Corp.).

Sulfo compositions. No. 2,447,005. Bernard W. Gamson (to Great Lakes Carbon Corp.).

Sulfo compositions. No. 2,447,006. Bernard W. Gamson (to Great Lakes Carbon Corp.).

Treating polyvinyl alcohol filaments to improve tensile strength. No. 2,447,140. Elbert M. Shelton and Walter Leland Thompson (to Johnson & Johnson).

Polymerization of vinyl and vinylidene chlorides in the liquid phase. No. 2,447,289. Hanns Peter Staudinger and Maurice Dudley Cooke (to The Distillers Co., Ltd.).

Reaction product of rosin-polyhydric alcohol esters. No. 2,447,367. John B. Rust and William B. Canfield (to Montclair Research Corp. and Ellis-Foster Co.).

Gamma polyvinyl chloride resin solution. No. 2,447,398. Bronislaw de Supinski (to The Glenn L. Martin Co.).

Decolorizing petroleum hydrocarbon resins by extracting with selective solvents. No. 2,447,404. Neal W. Furby (to California Research Corp.).

In the method of preparing a resinous, noninflammable, hydrocarbon soluble substance by forming a rubbery solid homopolymer having a molecular weight in excess of 20,000 by polymerizing 2-methylpentadiene-1,3 by the application thereto of a Friedel-Crafts catalyst dissolved in a non-complex forming halogenated alkane of 1 to 5 carbon atoms per molecule, the improvement comprising dissolving the rubbery homopolymer in a solvent selected from the class consisting of benzene and toluene, and adding to this solution a halogen-containing substance selected from the group consisting of chlorine, bromine and hydrogen chloride to saturate at least a portion of the double bonds present in the homopolymer and thereby to form a resinous, hydrocarbon soluble solid substance. No. 2,447,610. John D. Calfee and Robert M. Thomas (to Standard Oil Development Co.).

Preparing organo-poly-siloxane resins from mixtures containing phenyl and methyl substituted silicon chlorides produced by interaction of silicon tetrachloride with phenyl and methyl Grignard reagents. No. 2,447,611. William R. Collings, Howard N. Fenn and Herbert J. Fletcher (to Dow Corning Corp.).

Urea-formaldehyde molding composition. No. 2,447,621. Leonard Smidth.

In the art of molding, the process which includes mixing an aqueous solution of sodium silicate and a quantity of sodium silicofluoride. No. 2,447,725. William H. Adams, Jr., and Hans H. Lebach (to Haveg Corp.).

Synthetic material characterized by stability to heat at temperatures up to 250° C. and by stability to ultra-violet radiation, said synthetic material being a dicarboxylic acid and having the structural formula of a product theoretically obtained by the Diels-Alder addition of levopimaric acid and a monoester of fumaric acid with an unsubstituted aliphatic monohydric alcohol having less than four carbon atoms assuming the transconfiguration of the fumaric ester group remains unchanged. No. 2,447,750. George C. Harris (to Hercules Powder Co.).

Preparing a polyvinyl acetal ketal resin by reacting a polyvinyl acetal resin from a saturated aliphatic aldehyde in an anhydrous neutral organic solution and in the presence of an inorganic condensation catalyst of acid reaction with saturated aliphatic monoketone. No. 2,447,773. Joseph D. Ryan and Fred B. Shaw (to Libbey-Owens-Ford Glass Co.).

An optical element comprising in combination means providing a supporting surface and a substantially uniform solid film of an evaporatable polyindene resin and minute particles of isophthalic acid. No. 2,447,805. Mark Hyman, Jr. (to Polaroid Corp.).

Process which comprises forming a polymerizable mixture consisting of a $CH_2{:}C<$ substituted aromatic hydrocarbon selected from the group consisting of styrene, alpha-methylstyrene and alpha, para-dimethylstyrene, together with maleodinitrile. No. 2,447,810. David T. Mowry (to Monsanto Chemical Co.).

Process of forming a polymerizable mixture of a $CH_2{:}C<$ substituted aromatic hydrocarbon selected from the group consisting of styrene, alpha-methylstyrene and alpha-paradimethylstyrene, together with 1,2-dicyano-1-chloroethylene. No. 2,447,811. David T. Mowry (to Monsanto Chemical Co.).

Process of forming a polymerizable mixture consisting of a $CH_2{:}C<$ substituted aromatic hydrocarbon selected from the group consisting of styrene, alpha-methylstyrene and alpha,paradimethylstyrene, together with 1,2-dicyano-1-methylethylene. No. 2,447,812. David T. Mowry (to Monsanto Chemical Co.).

Process of forming a polymerizable mixture consisting of a $CH_2{:}C<$ substituted aromatic hydrocarbon selected from the group consisting of styrene, alpha-methylstyrene and alpha,paradimethylstyrene, together with 1,2-dicyano-1-phenylethylene. No. 2,447,813. David T. Mowry (to Monsanto Chemical Co.).

Preparing organohalogenosilanes containing a hydrogen attached directly to the silicon atom by reaction between a hydrocarbon halide in the vapor state and the silicon component of a mass comprising silicon and a preformed halide of copper. No. 2,447,873. Eugene G. Rochow (to General Electric Co.).

Reacting a low boiling conjugated diene with sulfur dioxide to form a less volatile decomposable sulfone. No. 2,448,053. Frank William Rose, Jr. (to Houdry Process Corp.).

Removing the combined halogen from a polymer of the class consisting of polyindene, polycoumarone and polystyrene prepared by the action of a Friedel-Crafts type catalyst which comprises intimate admixture with a stream of an aqueous alkaline solution. No. 2,448,127. Herbert Muggleton Stanley, Francis Edward Salt and James Frederick Williams (to The Distillers Co., Ltd.).

Making a gas expanded organoplastic material which comprises mixing a symmetrical xenyltriazene with an organoplastic material and decomposing said triazene by heat to evolve nitrogen and expand said organoplastic material. No. 2,448,154. Henry H. Richmond and Markian Tomiuk (to U. S. Rubber Co.).

Production of a convertible alkyd resin which comprises heating and reacting a compound from the group consisting of dicarboxylic acids and dicarboxylic acid anhydrides with an equimolecular proportion of a mono-alkenyl ether of glycerol wherein the alkenyl radical contains 3 to 6 carbon atoms and has the olefinic linkage between two carbon atoms, one of which is the carbon atom of a terminal methylene group

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and the other of which is linked directly to the saturated carbon atom having the etheral oxygen atom of the ether linked directly thereto. No. 2,448,258. Theodore W. Evans and David E. Adelson (to Shell Development Co.).

Polymerizable ester of an alcohol having an aliphatic multiple linkage between two carbon atoms and trimethyladipic acid wherein the methyl groups are substituted upon the alpha and gamma carbon atoms. No. 2,448,259. Harry de V. Finch (to Shell Development Co.).

Reacting polyvinyl alcohol with dihydropyran in the presence of an acid catalyst. No. 2,448,260. Nestor Winston Flodin (to E. I. du Pont de Nemours & Co.).

Aminotriazine-aldehyde condensation products with linolenic acid monoglyceride. No. 2,448,338. Gustav Widmer and Willi Fisch (to Ciba Products Corp.).

Solid extrudable composition comprising polyvinyl alcohol, polyhydric alcohols, plasticizer, and phthalic anhydride. No. 2,448,358. Charles Dangelmajer (to Resistoflex Corp.).

Interpolymer of styrene and tetraallylsilane. No. 2,448,391. James J. Pyle (to General Electric Co.).

Mixing granular polyvinyl acetate wet with water, with an amount of dialkali metal adipate and a quantity of sulfated alcohol alkali metal salt having 8 to about 18 carbon atoms and subsequently drying. No. 2,448,524. Edmund John Gentner (to E. I. du Pont de Nemours & Co.).

Curable composition comprising (1) a solid, elastic, curable methylpolysiloxane containing an average of from 1.98 to 2.00 methyl groups per silicon atom, said solid methylpolysiloxane having been obtained by condensing a liquid consisting of polymeric dimethylsiloxane containing up to 2 mol per cent copolymerized monomethylsiloxane (2) from 0.1 to 6 per cent, by weight, based on the weight of (1) a substance selected from the class consisting of mercury, oxides of mercury and salts of mercury, and (3) a peroxide cure accelerator for (1). No. 2,448,530. Henry F. Jones (to General Electric Co.).

Resinous copolymer of isopropenyl acetate and an ester selected from the group consisting of an ester of a monohydric alcohol and maleic acid and an ester of monohydric alcohol and fumaric acid. No. 2,448,531. William O. Kenyon and Cornelius C. Unruh (to Eastman Kodak Co.).

Polymer composition comprising a finely divided alkaline carbonate mixed with an acyl peroxide cured polyester. No. 2,448,572. Burnard S. Biggs (to Bell Telephone Laboratories Inc.).

Making resinous materials adapted for liquid coating compositions by heating talloil to a sufficiently high temperature to cause resinification in the presence of lime, adding lime, heating until a sample of said mixture placed upon a glass plate will upon cooling form a hard transparent pill and the material becomes resinous. No. 2,448,621. William J. Rice.

Heat-sealing adhesive tape comprising a support coated with a condensation product prepared by mixing melamine with aqueous formaldehyde and adding the resulting aqueous condensation product to an aqueous water soluble organic solvent solution of a partially hydrolyzed homopolymer of vinyl acetate. No. 2,448,638. Thomas F. Murray, Jr., and George F. Sharrard (to Eastman Kodak Co.).

Polyethylene-polyvinyl acetal composition. No. 2,448,666. David A. Fletcher and Malcolm M. Renfrew (to E. I. du Pont de Nemours).

Copolymer comprising 2-chloroallyl propionate interpolymerized with butadiene-1,3. No. 2,448,703. Albert M. Clifford (to Wingfoot Corp.).

Oily organic condensation reaction product obtained by reacting under alkaline conditions an anacardic material selected from the group consisting of cashew nut shell liquid and distillates of cashew nut shell liquid with a hydrocarbon polychloride having at least one alkyl group, having at least one of its chlorine atoms on a terminal alkyl group and having at least 2 carbon atoms. No. 2,448,715. Mortimer I. Harvey (to The Harvel Corp.).

Plastic composition comprising a mixture consisting of polythene and a microcrystalline hydrocarbon wax and a metal salt of a long chain fatty acid. No. 2,448,799. William B. Happoldt, Jr., and Alfred Stockfleth (to E. I. du Pont de Nemours & Co.).

Preparing polymers comprising irradiating, with light having a wave length of 1800-7000 angstroms, a photopolymerizable ethylenically unsaturated organic compound containing a photopolymerizable catalyst of an acyloin ether of the formula

$$R—CHOR''—CR'O$$

wherein R, R' and R'' are monovalent hydrocarbon radicals. No. 2,448,828. Malcolm M. Renfrew (to E. I. du Pont de Nemours & Co.).

Condensation products of polyhydroxy alkylamines with aldehydes. No. 2,448,890. William B. Johnston (to American Cyanamid Co.).

Blending an organic solvent soluble completely hydrolyzed ethylene-vinyl ester polymer with a compound selected from the group consisting of acyl peroxides and inorganic peroxides, and then heating the blend until said polymer becomes insoluble in organic solvent in which it was initially soluble, said polymer being that obtained by hydrolyzing the copolymerization product of ethylene and a vinyl alcohol ester of a saturated aliphatic monocarboxylic acid. No. 2,448,946. Witty L. Alderson, Jr. (to E. I. du Pont de Nemours & Co.).

Obtaining a dispersion of tetrafluoroethylene/ethylene copolymer comprising finely divided particles of said copolymer suspended in a liquid organic medium, comprising dissolving tetrafluoroethylene/ethylene copolymer containing combined tetrafluoroethylene in major amount in an organic liquid which is heated and which is a solvent for said copolymer and a non-solvent for said copolymer, said organic liquid boiling, being a neutral ester of a saturated dicarboxylic acid containing at least 5 carbon atoms, said ester being free of multiple carbon-to-carbon linkages and containing from 7 to 18 carbon atoms. No. 2,448,952. Kenneth L. Berry (to E. I. du Pont de Nemours & Co.).

Polymerizing an alpha alkyl styrene in which the alkyl group contains not more than 3 carbon atoms, which comprises contacting said alpha alkyl styrene with a hydrogenating catalyst and an alkali metal hydrocarbon compound where the alkali metal is directly bonded to a hydrocarbon radical. No. 2,448,976. Randall G. Heiligmann (to The Atlantic Refining Co.).

Mixture of hydrolyzed ethylene-vinyl ester copolymer and N-substituted polyamide. No. 2,448,978. Fred Wayne Hoover (to E. I. du Pont de Nemours & Co.).

Curing butadiene-acrylic nitrile copolymer by preparing a mix of said copolymer, an ester of an alcohol containing from 2-6 carbon atoms selected from the group consisting of the alkyl, alkoxy alkyl, hydroxy alkyl, alicylic, benzyl and furfuryl alcohols and a dicarboxylic acid containing from 2-10 carbon atoms, and a catalyst which is non-acidic at temperatures below room temperature but which provides acid selected from the group consisting of hydrochloric acid, sulfamic acid, and toluene sulfonic acid at temperatures of 100° C. and above and which is solid at room temperature. No. 2,449,058. Loring Coes, Jr. (to Norton Co.).

Controlling the oil phase gelling and polymerization of a polymerizable mix comprising a liquid polyhydric alcohol ester of an alpha-olefinic dicarboxylic acid, and a liquid monomeric unsaturated polymerizable compound in which the unsaturation is due to a single terminal ethylenic group which is attached to a negative radical, and in which the said ester is soluble, in the presence of a peroxy polymerization catalyst, and a promoter of gelation which is a secondary monoamine that contains attached to the nitrogen atom one functionally aliphatic radical selected from the class consisting of alkyl hydrocarbons having from 1-5 carbon atoms and beta-hydroxyethyl, and one aromatic hydrocarbon radical of the benzene series. No. 2,449,299. Everett C. Hurdis (to U. S. Rubber Co.).

Preparation of polyformals which comprises heating a dialkyl formal of the formula $ROCH_2OR$ in which R is an alkyl group having from 1-4 carbon atoms, with formaldehyde in the presence of an acid-reacting catalyst, continuing the resulting reaction until a reaction mixture approximating equilibrium is obtained, thereupon destroying the said acid reacting catalyst by addition of alkali and distilling from the reaction product polyformals of the formula $RO(CH_2O)_nR$ in which R is an alkyl group having from 1-4 carbon atoms and n is an integer from 2-4. No. 2,449,469. William F. Gresham and Richard E. Brooks (to E. I. du Pont de Nemours & Co., Inc.).

In a continuous two-step process for the direct preparation of polymer-from-ethylene emulsions wherein an unemulsified polymer is obtained in the first step in the presence of an ethylene polymerization catalyst, the second step which comprises introducing an emulsifying medium, and an emulsifying agent into the reaction mixture containing polymer. No. 2,449,489. Alfred T. Larson (to E. I. du Pont de Nemours & Co., Inc.).

Composition comprising the product of copolymerization of a mass containing (1) monovinylphenoxthine and (2) a different $CH_2{=}C<$-containing compound which is copolymerizable with the monovinylphenoxthine. No. 2,449,528. Ralph G. Flowers and Leola W. Flowers (to General Electric Co.).

Canadian

Condensation product of ethylene sulfide and cyanamide. No. 451,023. Leonard P. Moore and Walter P. Ericks (to American Cyanamid Co.).

Production of high molecular weight polyene aldehydes by subjecting crotonaldehyde to a condensation reaction in a reaction medium comprising water, a lower aliphatic alcohol and a condensation catalyst comprising a member of the group consisting of secondary amines and salts thereof, the water produced by said condensation reaction being maintained in the reaction medium during the course of said reaction. No. 451,269. George W. Seymour and Victor S. Salvin (to Camille Dreyfus).

Preparing a stable emulsion of water-stable and water-insoluble polyvinyl formal resin. No. 451,375. Henry Michael Collins (to Shawinigan Chemicals, Ltd.).

Polymerizing an aqueous suspension of a monomeric polymerizable organic liquid compound which is a solid at normal temperature in its fully polymerized state, in a reaction vessel provided with means for condensing and returning to said vessel volatilized material, which comprises initiating polymerization of said monomer and, thereafter until the completion of the polymerization reaction, abstracting heat from said suspension for a period sufficient momentarily to terminate the acceleration of the rate of said polymerization reaction whenever said polymerization reaction accelerates to a rate approaching that sufficient to cause clustering of the polymerizing compound. No. 451,443. Barnard Mitchel Marks (Canadian Industries, Ltd.).

Obtaining a resinous material by polymerizing the polymerizable components of an emulsion consisting of vinyl chloride in admixture with the diethyl ester of fumaric acid and containing ammonium perdisulphate and the sodium salt of sulphonated paraffin oil, said emulsion during said polymerization being in contact with an atmosphere of nitrogen. No. 451,445. Harold Wilfred Arnold (to Canadian Industries, Ltd.).

An interpolymer of isobutylene and vinyl methacrylate. No. 451,446. Denis William Huebner and James Edgar Fearey (to Canadian Industries, Ltd.).

The reaction product of polyvinyl butyral resin having a free hydroxyl content with butanol modified urea-formaldehyde resin. No. 451,447. Ernest A. Rodman (Canadian Industries, Ltd.).

Manufacture of products having a chain comprising a plurality of recurring styrene units and attached to the terminal units of the chain, one H— radical and one —CCl$_3$ radical, respectively, which comprises maintaining styrene and chloroform in contact with benzoyl peroxide until said products are formed. No. 451,448. Jesse Harmon (to Canadian Industries, Ltd.)

Transparent lamination comprising a sheet of glass and a sheet of polymethyl methacrylate united by an interlayer formed by polymerizing methyl methacrylate, a compound from the group consisting of tetrallyl and tetramethallyl silicates, and a plasticizer for polymethyl methylacrylate. No. 451,453. Erenst Eugene Lewis (to Canadian Industries, Ltd.).

Preparing a vulcanized insoluble interpolymer of vinyl chloride with diethyl fumarate which comprises heating said interpolymer with sulphur, zinc oxide, and mercaptobenzothiazole. No. 451,454. Benjamin Wilson Howk and Henry John Richter (to Canadian Industries, Ltd.).

A process for preparing a polyvinyl alcohol resistant to water which comprises bringing a polyvinyl alcohol containing at least three hydroxyl groups in contact with an alpha-polyhalogenated macromolecular linear polymeric ether containing at least 1% halogen and at least three halogen atoms, per mol, on alpha carbon. No. 451,456. Carl Walter Mortenson (Canadian Industries, Ltd.)

Solution of polyethylene suitable for the hot-dip coating of objects in a polyethylene solvent taken from the class of unsaturated hydrocarbon solvents and unsaturated chlorinated hydrocarbon solvents and containing between 15 and 60% by weight of a saturated hydrocarbon. No. 451,475. Richard George Woodbridge (to E. I. du Pont de Nemours & Co., Inc.).

Moulding powder for injection moulding composed of cellulose acetate, a plasticier and a trialkyl carbinol. No. 451,567. George F. Metz.

Composition stable against deterioration by heat in the presence of iron and compounds thereof, said composition comprising a resin selected from the group consisting of polymers of vinylidene chloride and copolymers thereof with other unsaturated compounds copolymerizable therewith, which copolymers contain at least 25% of the elements of vinylidene chloride, together with a stabilizing substance seleated from the group consisting of polyglycols, primary and secondary polyhydroxy aliphatic alcohols containing more than 2 hydroxyl groups, and condensates thereof with themselves, glycols and polyglycols, and partial esters and ethers of the said polyglycols, polyhydroxy aliphatic alcohols and condensates. No. 451,645. Milton R. Radcliffe (to The Firestone Tire & Rubber Co.).

Manufacture of dicyanodiamide condensation products comprising reacting a condensation product from dicyanodiamide and formaldehyde with an ammonium salt of a mineral acid and finally condensing the so-obtained product with formaldehyde. No. 451,650. Jules Treboux and Ricardo Bellvila (to J. R. Geigy A. G.).

Resinous coating composition comprising an oil-free polymerizable phenol formaldehyde resin, an inert filler, and a solvent consisting of steam-distilled pine oil, ethyl alcohol and butyl alcohol, said resin being substantially completely dissolved in said solvent and the resulting composition having a viscosity of between 18 and 40 seconds as determined by Ford viscosity cup No. 4. No. 451,655. Charles H. Hempel and Francis J. Ploederl (to Heresite & Chemical Co.).

Production of shaped structures having a basis of regenerated cellulose, which comprises dissolving alkali-soluble oxidized cellulose in an aqueous alkaline solution, and extruding the solution obtained through suitably shaped orifices into an acid coagulating medium so as to cause the soluble cellulose to be precipitated from solution in the desired, shaped form. No. 451,727. Camille Dreyfus and Richard R. Sitzler (to Camille Dreyfus).

*Processes and Methods

Dielectric heating of emulsions. No. 2,446,557. Phillip W. Schutz and Everett K. McMahon (to Induction Heating Corp.).

Powdered catalyst conversion system for suspending regenerated catalyst in superheated carrier gas. No. 2,446,678. Vanderveer Voorhees (to Standard Oil Co.).

Separating oil from a gas or vapor. No. 2,446,882. Joseph I. Morrison.

Contacting gases with particle form solid material. No. 2,446,986. Thomas P. Simpson (to Socony-Vacuum Oil Co., Inc.).

Counterflow liquid solvent extraction of oleaginous matter from divided material. No. 2,447,845. Clarence F. Dinley (to Detroit Rex Products Co.).

Low-temperature distillation of fuels by direct contact with reheated distillate vapors. No. 2,448,223. Henri Lantz (to Societe Chimique de la Grande Paroisse).

Analysis by fluorescent x-ray excitation. No. 2,449,066. Herbert Friedman.

Catalytic conversion systems employing fluidized solids. No. 2,449,095. Harry K. Wheeler, Jr., and Robert J. Hengstebeck (to Standard Oil Co.).

Power recovery from catalytic conversion systems employing fluidized solids. No. 2,449,096. Harry K. Wheeler, Jr. (to Standard Oil Co.).

Canadian

Method of determining the total quantity of an element chosen from the group consisting of potassium, rubidium, iron, sulfur, sodium, calcium, cobalt, zinc, carbon, chromium and manganese, which element occurs in a sample in the form of its radioactive and non-radioactive isotopes and in the substantial absence of unknown interfering radioactivity, which comprises measuring the radioactivity emitted from the radioactive isotope in apparatus calibrated by measuring the radioactivity of standard solutions. No. 451,025. Robert B. Barnes (to American Cyanamid Co.).

Coating or impregnating articles with sulphur in a finely divided state, the sprayed material being subjected to heat while being sprayed to render the particles of the sprayed material plastic and firmly adherent to one another and to the articles. No. 451,116. Charles Fletcher Lumb (to Schori Metallising Process, Ltd.).

A method of extinguishing flammable liquid fires by converting a foam forming liquid into particles, converting the liquid particles at a preselected distance from the point at which the liquid is converted into particles into bubbles to form a large body of foam having considerable vertical thickness and lateral spread and made up of relatively uniform and discrete bubbles, and directly applying the resulting foam to a fire. No. 451,353. Evan C. Williams (to General Aniline & Film Corp.).

Producing a dry gas atmosphere by heating a lithium containing material to produce a lithium containing vapor, passing a gas composed of at least one of the group consisting of methane, carbon monoxide, carbon dioxide, hydrogen, nitrogen and air over said heated material to entrain said vapor, and maintaining said gaseous medium at a sufficient temperature to retain said vapor until chemical reduction of the water vapor in said medium is effected. No. 451,419. Harold Julius Ness.

Feeding pulverized material from an aerating chamber which comprises maintaining a bed of pulverized material in said chamber, passing a stream of carrier air through said bed to aerate said pulverized material and to convey entrained pulverized material from said bed. No. 451,432. Ervin G. Bailey and Ralph M. Hardgrove (to The Babcock & Wilcox Co.).

*Rubber

Solid, elastic curable polysiloxane consisting of methyl radicals, and hydrogen, silicon, and oxygen atoms obtained by condensing a liquid consisting of polymeric dimethylsiloxane containing (a) up to 2 mol per cent copolymerized monomethylsiloxane and (b) from 1.5 to 50 mol per cent copolymerized methylhydrogensiloxane. No. 2,448,556. Murray M. Sprung and Charles A. Burkhard (to General Electric Co.).

Solid, elastic, curable methylpolysiloxane consisting of methyl radicals and silicon and oxygen atoms and containing an average of from 1.98 to 2.00 methyl groups per silicon atom, said solid methylpolysiloxane having been obtained by condensing a liquid consisting of polymeric dimethylsiloxane containing up to 2 mol per cent copolymerized monomethylsiloxane, having incorporated therein from 1 to 6 per cent by weight thereof of benzoyl peroxide. No. 2,448,565. James G. E. Wright and Curtis S. Oliver (to General Electric Co.).

Cured synthetic elastomer obtained by curing, with benzoyl peroxide, a viscous, gummy 2,3 dihydroxy-butane-dicarboxyhydrocarbon polyester. No. 2,448,584. Carl J. Frosch (to Bell Telephone Laboratories, Inc.).

Cured synthetic rubber comprising a product obtained by heating with a small amount of benzoyl peroxide, a fusible polyester prepared by the esterification of a reaction mixture consisting of a dihydroxy straight chain alkane and isopropylene glycol, together with a mixture of dicarbolic acids consisting of sebacic acid and maleic acid. No. 2,448,585. Calvin S. Fuller (to Bell Telephone Laboratories, Inc.).

Reinforced cured elastomer composition comprising an organic peroxide cured glycol-dicarboxylic acid polyester intimately mixed with a finely divided, substantially pure, red oxide of iron. No. 2,448,609. Frank S. Malm (to Bell Telephone Laboratories, Inc.).

Solid, elastic, curable methyl polysiloxane consisting of methyl radicals and silicon and oxygen atoms and containing an average of from 1.98 to 2.0 methyl groups per silicon atom, said solid methyl polysiloxane being the product of condensation of a liquid polymeric dimethylsiloxane containing up to 2 mol. per cent copolymerized monomethylsiloxane. No. 2,448,756. Maynard C. Agens (to General Electric Co.).

Preparing homogeneous, partially chlorinated derivatives of hydrocarbon rubbers, selected from a class consisting of natural rubber, balata and gutta percha, said derivatives containing from about 5 to 50% of chlorine by mixing a solution of such a hydrocarbon rubber with sulphuryl chloride. No. 2,448,809. Carel Koningsberger (to Rubber Stichting).

Blend of a phenol-rubber and a heat-convertible resorcinol-formaldehyde resol. No. 2,449,180. Herman E. Schroeder (to E. I. du Pont de Nemours & Co., Inc.).

Composition of matter comprising a synthetic, rubbery, high molecular weight, conjugated diolefin polymer with an aliphatic alpha-(acylthio)-carboxylic acid. No. 2,449,418. William Henry Sharkey (to E. I. du Pont de Nemours & Co., Inc.).

*Textiles

Modifying cellulose textiles with an alkylolamine-copper complex. No. 2,446,682. Thomas C. Whitner (to Chem. Laboratories, Inc.).

Water repellent finish for textiles comprising a substituted urea. No. 2,446,864. Ellis Abrams (to Quaker Chem. Products Corp.).

Pure white discharging effects on cellulosic materials. No. 2,446,992. Charles Babey and Frederic Leathley Goodall (to J. R. Geigy A.-G.).

Treating wool by heating in an aqueous emulsion at a temperature of from 40° C. to the boiling point of the bath containing a synthetic butadiene polymer of 100% polymerization and a non-cationic emulsifying agent in the presence of at least 25% by weight on the polymer of a water-soluble neutral salt of an alkali metal. No. 2,447,538. John B. Rust (to Montclair Research Corp.).

Treating wool to give shrinkproofing with an aqueous stable emulsion containing a synthetic copolymer of 100% polymerization of butadiene-1,3 and from 5 to 50% based on the weight of the copolymer of a methacrylate ester, the esterifying group having less than 8 carbon atoms, in amount to give 1 to 25% by weight of polymer deposition on the wool, a non-cationic emulsifying agent, and at least 25% by weight on the copolymer of a water-soluble neutral salt of an alkali metal. No. 2,447,539. John B. Rust (to Montclair Research Corp.).

Treating wool to give shrinkproofing with substantially normal hand which comprises an aqueous substantially stable emulsion containing a copolymer of 100% polymeriation of butadiene-1,3 and from 10 to 60% by weight of the copolymer of an acrylate ester, the esterifying group being selected from alkyl and aryl groups of not more than 8 carbon atoms, a non-cationic emulsifying agent, and the copolymer of a water-soluble neutral salt of a monovalent salt forming radical. No. 2,447,540. John B. Rust (to Montclair Research Corp.).

Shrinkproofing wool with stable emulsion of a synthetic butadiene polymer, a non-cationic emulsifying agent, and the polymer of a water-soluble neutral salt of an alkali metal. No. 2,447,772. John B. Rust and Charles W. Pfeifer (to Montclair Research Corp.).

Bath for treating wool to give shrinkproofing which comprises an aqueous substantially stable emulsion of a synthetic butadiene polymer of 100% polymerization, and a soap alone as the essential emulsifying agent, the soap being an alkali metal salt of a fatty acid containing at least 10 carbon atoms, and at least 25% by weight on the polymer of a water-soluble neutral salt of an alkali metal. No. 2,447,876. John B. Rust (to Montclair Research Corp.).

Treating wool to give shrinkproofing with substantially normal hand which comprises an aqueous substantially stable emulsion containing a synthetic copolymer of 100% polymerization, of butadience 1.3 and from 10 to 80% by weight in the copolymer of a 2, methyl butadiene 1.3 selected from the group consisting of isoprene and 2,3 dimethyl butadiene 1.3, a non-cationic emulsifying agent, a water-soluble neutral salt of an alkali metal. No. 2,447,877. John B. Rust (to Montclair Research Corp.).

Shrink-proofing wool with an aqueous substantially stable emulsion containing a synthetic copolymer of 100% polymerization, of butadiene 1.3 and from 10 to 60% by weight in the copolymer of a benzene containing an unsaturated side chain of two carbon atoms selected from the group consisting of styrene, α-, β-dimethyl styrene, dichlorostyrene, and phenyl-acetylene, a non-cationic emulsifying agent and a water-soluble neutral salt of an alkali metal. No. 2,447,878. John B. Rust (to Montclair Research Corp.).

Treating wool to give shrinkproofing with an aqueous substantially stable emulsion of a synthetic copolymer of 100% polymerization of chloroprene and an alkyl methacrylate, the alkyl group having from 1 to 4 carbon atoms, the emulsion containing a non-cationic emulsifying agent and at least 25% by weight on the copolymer present of a water-soluble neutral salt of an alkali metal. No. 2,448,004. John B. Rust (to Montclair Research Corp.).

Treating wool to give shrinkproofing with an aqueous substantially stable emulsion containing a copolymer of 100% ploymerization of chloroprene and the copolymer of a compound selected from the group consisting of an alkyl acrylate, the alkyl group containing not more than 4 carbon atoms, styrene, dimethyl styrene, dichloro styrene, acrylonitrile, and methacrylonitrile, the emulsion containing a non-cationic emulsifying agent and a water-soluble neutral salt of an alkali metal. No. 2,448,005. John B. Rust (to Montclair Research Corp.).

Making cotton textiles water-absorbent and rot-resistant by impregnating a cotton textile with chloracetic acid, treating with a solution of an alkali metal hydroxide to give carboxymethyl substituents and then treating with a solution of a salt which yields metal ions in the solution and produces a non-soluble metal salt of the carboxymethyl groups, the said salt being selected from the class consisting of salts of copper, iron, silver, nickel, mercury, lead and aluminum. No. 2,448,153. John David Reid and George C. Daul (to U.S.A. by the Secretary of Agriculture).

Treating fibers and fabrics to render them water repellent, which consists in subjecting them to the action of an aqueous solution of a compound answering to the formula

(1) Me-X-Ar-OOCR(2)

where

(a) Ar is a divalent aromatic nucleus selected from the group consisting of C_6H_4 and $C_{10}H_6$
(b) R is a saturated aliphatic chain containing 7 or more carbon atoms
(c) X is selected from the group consisting of (-COO)- and ($-SO_3O$)-
(d) Me is an alkali metal
(e) And groups (1) and (2) are in ortho or para relationship in the benzene compound and in two-three or one-four relationship in the naphthalene series.

No. 2,448,247. Carl R. Bellwood (to The Cravenette Co.).

Textile yarn of cellulose acetate sized with casein, triethanolamine and triethyl phosphate. No. 2,448,571. Ralph H. Balch and Irma G. McCormick (to Celanese Corp. of America).

Canadian

Increasing the lustre and water-receptivity of cellulose yarns and fabrics

*U. S. Patents from Vol. 613, Nos. 2, 3, 4, 5. Vol. 614, Nos. 1, 2. Canadian from Sept. 7-Oct. 5.

which comprises treating the material in separate operations with acrylonitrile and a strong hydroxide, washing the treated material until substantially free of the hydroxide and drying. No. 451,506. James W. Stallings (to Rohm & Haas Co.).

Manufacture of textile assistants comprising reacting organic compounds containing sulphonic groups and possessing tanning properties with quaternary ammonium compounds containing a member selected from the group consisting of higher-molecular aliphatic and cyclo-aliphatic radicals and finally rendering alkaline the obtained product. No. 451,-651. Eduard Schwager and Jakob Bindler (to J. R. Geigy A. G.).

Treating a textile material wherein a solution of cellulosic material is then precipitated from said solution on to the textile material, the steps of applying to the textile material in aqueous alkaline solution of a cellulosic material produced by at least partially oxidizing cellulose with an agent selected from the group consisting of periodic acid and nitrogen tetroxide, and acidifying the treated textile material so as to cause the cellulosic material to precipitate on the textile material. No. 451,-728. George W. Seymour and George C. Ward (to Camille Dreyfus).

*Specialties

Adhesive composition comprising a polyalkylene glycol and an alkyd resin. No. 2,446,581. Leon J. Gold and Samuel Zweig (to Millprint, Inc.).

Production of substitute leather. No. 2,446,806. Andre Bernard.

Soya meal-sewage sludge adhesive. No. 2,446,954. Donald V. Redfern (to Adhesive Products Co.).

Composition for cleaning glass and vitreous ceramic surfaces consisting of materials selected from the group consisting of sodium carbonate, trisodium phosphate, tetrasodium pyrophosphate and sodium metasilicate and an alkali-soluble zinc compound. No. 2,447,297. Walter F. Wegst and Leslie R. Bacon and Thomas H. Vaughn (to Wyandotte Chemical Corp.).

Composition of matter consisting of lecithin interpersed and suspended in dry Irish moss gel. No. 2,447,726. Wilber J. Allingham.

Birefringent solid film comprising intimate mixture of minute particles of isophthalic acid and terephthalic acid and method of manufacture. No. 2,447,790. Edgar E. Barr and Cutler D. West (to Polaroid Corp.).

Birefringent solid film of evaporated and deposited isophthalic acid. No. 2,447,792. Elkan R. Blout (to Polaroid Corp.).

Dispersing feathers in an essentially neutral aqueous solution containing monoethylene thioglycol and guanidine hydrochloride. No. 2,447,860. Chase B. Jones and Dale K. Mecham (to U.S.A. by the Secretary of Agriculture).

Anti-seize and sealing composition for a separable connection part of a high pressure oxygen respiratory line consisting essentially of a cellulose ether selected from the group consisting of ethyl, butyl and benzyl cellulose ethers, tricresyl phosphate as a plasticizer, a water-insoluble soap selected from the group consisting of zinc, aluminum, calcium and lead stearates, and powdery particles of inert material, in a volatile organic solvent for the cellulose ether and soap. No. 2,448,090. Robert C. Fuhrman (to The Parker Appliance Co.).

Penetrating oil comprising a hydrocarbon oil and dicyclohexyl. No. 2,448,-093. Lewis D. Gittings (to Monsanto Chemical Co.).

Composition stablized against oxidative deterioration comprising a material containing a glyceride of an unsaturated higher fatty acid and a small amount of 5-pentadecyl resorcinol. No. 2,448,207. Harry M. Barnes (to General Foods Corp.).

Stabilizing a material containing an essential oil against oxidative deterioration by adding 5-pentadecyl resorcinol. No. 2,448,208. Harry M. Barnes (to General Foods Corp.).

Composition for application to coal to allay dusting comprising, in admixture, an unsaturated fatty acid having 18 carbon atoms, a petroleum oil soluble wetting agent, a low viscosity hydrocarbon distillate having a high aromatic component solvent for the said acid and wetting agent. No. 2,448,605. Werner E. Kleinicke (to The Johnson-March Corp.).

Compositions of matter having lubricating properties predominantly comprising liquid, water-immiscible monohydroxy 1,2-polyoxypropylene monoethers having an average molecule weight by acetyl values, between 1000 and 3000, said monoethers being obtained by adding propylene oxide to a heated body of a liquid acyclic alkanol having from 1 to 20 carbon atoms and containing an alkaline catalyst. No. 2,448,664. Harvey R. Fife and Fredreick H. Roberts (to Carbide and Carbon Chemicals Corp.).

Rust-inhibiting lubricant comprising hydrocarbon lubricating oil, an alkaline earth metal petroleum sulfonate, and a pure aliphatic alcohol containing at least 5 carbon atoms. No. 2,449,025. William R. Turner (to The Atlantic Refining Co.)

Process of obtaining a light-colored wax product from the hard dark-colored wax product, obtained from clarification mud of sugarcane factories by extraction of a crude wax product from the mud with an organic solvent for the crude wax product and recovering the hard dark-colored wax product by distilling off the solvent and subjecting the residue to the action of a selective solvent to dissolve out the fatty portions, by mixing the hard dark-colored wax product with a selective solvent selected from the group consisting of monohydric, saturated, aliphatic alcohols having 3 and more carbon atoms diluted with water, and acetic esters of monohydric, saturated, aliphatic alcohols diluted with water, and separating the solution containing the light-colored wax fraction from the insoluble, very dark-colored fraction. No. 2,449,107. Charles B. Broeg and Royal T. Balch (to U.S.A. as repres. by Secretary of Agriculture).

Liquid printing ink consisting of coloring matter and a binder dispersed in a hydrophilic liquid carrier containing water, the predominant constituent of said binder being a lignin from fiber liberation. No. 2,449,-230. Clarence E. Irion (to Margot Corp.).

Fishing bait consisting of oil of anise, pine tar, methyl salicylate, mineral oil and motor oil. No. 2,449,322. Isaac F. Richardson.

Foam prevention in extractive distillation of hydrocarbons with furfural solvent with beeswax. No. 2,449,427. George Thodos and Charles F. Weinaug (to Phillips Petroleum Co.).

Canadian

Improving the resistance to foaming of fatty materials by washing a fatty material with orthophosphoric acid and separating the treated fatty material from the aqueous acid and then hydrogenating the resulting product. No. 451,072. Howard C. Black (to Indust'l Patents Corp.).

Treating oleaginous material containing gum guaiac and normally tending to become discolored in the presence of metals by incorporating an acid reacting material stronger than acetic acid in sufficient amount. No. 451,074. Howard C. Black (to Indust'l Patents Corp.).

Welding flux consisting of lithium fluoride, magnesium fluoride, calcium fluoride, and barium fluoride in the absence of the fluorides of potassium and sodium. No. 451,229. Francis Arthur Fox and Edward Frederick Emley (to Magnesium Elektron Ltd.).

Article of apparel of high resistance to penetration by mustard gas in the vaporous or liquid condition comprising at least one layer of flexible porous material coated with a composition containing a cellulose derivative and polyhydric alcohol-polycarboxylic acid resin in which the polycarboxylic acid is an aliphatic dibasic acid of the general formula $COOH(HR)_n COOH$ wherein may be any integer between 2 and 4 inclusive. No. 451,449. George Anthony Griffiths (to Canadian Industries Ltd.).

Process for permanently waving hair, which comprises the steps of treating the hair with a reducing agent for keratin and then treating the hair with an oxidizing agent selected from the group consisting of the soluble ammonium, alkali metal and alkaline earth bromates and iodates. No. 451,504. Raymond E. Reed, David Tenenbaum, and Marion Den Beste (to Raymonds Labs., Inc.).

Process of treating hair which comprises treating the hair with thioglycolic acid for keratin, rinsing the reducing agent from the hair, forming the hair into a desired configuration and exposing the moist hair to a temperature of at least approximately 180°F. No. 451,505. Raymond E. Reed, David Tenenbaum, and Marion Den Beste (to Raymond Labs., Inc.).

*Water, Sewage and Sanitation

Automatic zeolite softener. No. 2,447,477. Frank D. Prager (to Graver Tank & Mfg. Co., Inc.).

Agriculture

Plant regulant herbicide, consisting of 2,4-dichlorophenoxyacetic acid, a dispersing agent, and the balance a mutual solvent for the 2,4-dichlorophenoxyacetic acid and the dispersing agent consisting of a mixture of cyclohexanone and hydrogenated naphtha. No. 2,450,543. Albert L. Flenner (to E. I. du Pont de Nemours & Co.).

Composition for the treatment of poultry containing a vehicle adapted for oral ingestion and a substance selected from the group consisting of 3-nitro-4-hydroxy phenyl arsonic acid, water soluble salts of 3-nitro-4-hydroxy phenyl arsonic acid and mixtures thereof. No. 2,450,866. Neal F. Morehouse and Orley J. Mayfield (to Dr. Salsbury's Laboratories).

Biochemical

Streptomycin. No. 2,449,866. Selman A. Waksman and Albert Schatz (to Rutgers Research and Endowment Foundation).

Process for manufacturing penicillin which comprises growing a penicillin producing mold in a nutrient medium containing corn steep liquor and containing an added amount over that contained in any corn steep liquor present of at least one substance selected from the group consisting of β-phenylethylamine, β-p-hydroxyphenylethylamine and salts of said amines. No. 2,451,853. Thomas Hobson Mead, Maurice Vincent Stack and Ernest Lester Smith (to Therapeutic Research Corp.).

Cellulose

Canadian

Composition for activating dry cellulose derivative and resinous cements comprising dynamite cellulose nitrate a 3 per cent acetone solution of which has a viscosity of from 40 to 200 seconds, and a liquid volatile vehicle containing at least one solvent for the said cellulose nitrate and the dry cement. No. 451,812. Earle Carver Pitman (to Canadian Industries, Ltd.).

Ceramics

Canadian

Shaped glass article having accurately contoured perforations, reticulations and the like formed by compressing a finely pulverized glass of 60-83% SiO_2, 0-6% Al_2O_3, 1-21% alkali metal oxide, and 8-39% B_2O_3, the ratio of alkali metal oxide to B_2O_3 being less than 1:1 and sintering. No. 452,143. Harrison Porter Hood (to Corning Glass Works).

Coatings

Paint paste composed of a base for water, casein, borax, and sodium silicate, and a base for oil of cooked linseed oil, lithopone, zinc oxide, both of said bases being combined with an emulsifier comprising castor oil and sulphuric acid. No. 2,450,072. Adolfo Cornelio Saavedra Zavaleta.

Inhibiting corrosion of an inner surface of a metal reactor within which is reacted hydrocarbons and halogen-containing materials at a reaction temperature sufficient to cause isomerization of the hydrocarbons comprising lining the inner surfaces to be protected with a non-metallic material and spraying the corresponding outer surface of the reactor with water to maintain said inner surface at a temperature substantially below the reaction temperature whereby the corrosion is substantially inhibited. No. 2,450,095. James E. Seebold (to Standard Oil Co.).

Heat resistant coating composition strongly adherent to non-porous metal surfaces and adapted to protect phosphatized metal surfaces which comprises a partially hydrolyzed lower alkyl ester of a silicic acid in which each of the alkyl groups contains no more than 4 carbon atoms; finely divided mica; water in amount approximately completing the hydrolysis of said partially hydrolyzed ester and providing a mixture of highly condensed esters by the hydrolytic condensation of said partially hydrolyzed and condensed ester; and a heat-resistant corrosion-inhibitive inorganic pigment. No. 2,450,327. Howard D. Cogan and Newton H. Ketcham (to Carbide and Carbon Chemicals Corp.).

Preparing a reaction product forming a film of increased water resistance, comprising cooking with sufficient water to give the final product a fluidity suitable for application at a temperature of 170-210° F. material selected from the group consisting of starch and low-soluble dextrin, with a water-soluble ureaformaldehyde reaction product, and sufficient acidic material to lower the pH to substantially 4.0, nad continuing the heating until the material passes through a range of increased viscosity where it is unsuitable for application and then decreases into a range

*U. S. Patents from Vol. 613, Nos. 2, 3, 4, 5. Vol. 614, Nos. 1, 2. Canadian from Sept. 7-Oct. 5.

where it is again suitable for application. No. 2,450,377. Carl C. Kesler, William C. Black, William L. Hicks and Carlton N. Owen (to Penick & Ford, Ltd., Inc.).

Providing a surface with a tough resinous coating comprising atomizing styrene, atomizing stannic chloride, intimately mixing the styrene and stannic chloride mists obtained, depositing the mixed spray on the article to be coated, and allowing it to air dry. No. 2,450,503. Folsom E. Drummond (to Chemical Developments Corp.).

Coating composition adapted particularly for lining fiber containers to prevent the sticking of asphalt when the same is poured hot into the container and permitted to cool, said composition consisting essentially of water, dispersed particles of wax, bentonite and graphite, and a plasticizer of the hygroscopic type, said constituents being in homogeneous admixture with the bentonite present therein in substantially greater proportions than the graphite and the wax in substantially the same proportion as the bentonite, the said bentonite and graphite serving as the barrier constituents. No. 2,451,362. Rudolph M. Snyder (to Henry A. Johnson).

Making a lacquer enamel which consists in providing a readily-dispersible pigment substantially free of materials having chalking tendencies, and a lacquer vehicle containing a cellulose derivative selected from the group consisting of nitro-cellulose and ethyl cellulose. No. 2,451,785. Marcus Thau (to Lacquer & Chemical Corp.).

Wax-free hot-melt coating composition consisting of an ethyl cellulose, the balance being a ternary mixture of a refined pale mineral oil; an ester of polymerized rosin with a polyhydric alcohol from the group consisting of ethylene glycol, diethylene glycol, and triethylene glycol; and a maleic anhydride-modified ester gum. No. 2,451,792. Arthur E. Young and Kenneth D. Bacon (to The Dow Chemical Co.).

Coating with synthetic resin containing an accelerator, and resin composition. No. 2,452,005. William C. Weltman and Thomas F. Dixon (to Westinghouse Electric Corp.).

Canadian

Metal-protective pigment composition consisting of a mixture of ammonium ferrous phosphate in flake-like, crystalline form and zinc yellow. No. 451,819. Godfrey Grimm (to Canadian Industries, Ltd.).

Coating composition comprising an organic film-forming vehicle containing a cellulose derivative selected from the group consisting of cellulose esters and cellulose ethers and as a pigment hydrous iron oxide characterized by an average particle size diameter of less than 100 millimicrons. No. 451,866. Robert Tyler Hucks (to E. I. du Pont de Nemours & Co.).

Surgical tape having an adhesive coating composition containing a salt of proprionic acid. No. 451,930. Walter R. Russ, Charles Hoffman, Thomas R. Schweitzer and Gaston Dalby (to Ward Baking Co.).

Admixture for preparing a coating solution for coating aluminum and alloys thereof in which aluminum is the principal ingredient, the essential active coating-producing ingredients of which are compounds of fluorine yielding fluoride ions in solution, of phosphorus as orthophosphate, and of hexavalent chromium. No. 452,254. Frank Palin Sprunance, Jr.

Preparing coating compositions by forming an aqueous suspension of a material from the group consisting of minerals and pigments, adding protein sufficient to satisfy the specific protein absorptive capacity of the mineral or pigment, incorporating a raw starch therein and subjecting the resulting mixture to the action of anamylolytic enzyme on a protein carrier. No. 452,405. William L. Craig (to R. T. Vanderbilt Co. Inc.).

Coating composition capable of forming an artificial rawhide covering comprising glue derived from rawhide, invert sugar, glycerine, phenol and safrol. No. 452,428. Joseph A. Schroeder.

Detergents and Surface-Active Media

Canadian

Detergent composition consisting of a reaction product of 1, 3-dioxolene with a water-insoluble hydrophobic organic oxygenated compound, which prior to the addition of the 1, 3-dioxolane group contained a reactive hydrogen atom and a sudsing agent selected from the group consisting of sulphonated higher fatty alcohols, soaps, Turkey-red oil, saponin, aliphatic sulphonic acids and aromatic sulphonic acids. No. 451,808. Donald John Loder (to Canadian Industries Ltd.).

Detergent mixture of hydrocarbon-substituted aromatic sulfonates having at least 7 carbon atoms and an average of at least 10 carbon atoms in hydrocarbon radicals introduced by alkylation, in which the said radicals are derived from a hydrocarbon mixture of the type of a petroleum distillate containing an average of at least 10 carbon atoms per molecule, said detergent mixture including hydrocarbon-substitute aromatic sulfonates in which a single non-aromatic carbon atom of a hydrocarbon radical introduced by alkylation is linked directly to a carbon atom of the aromatic nucleus and hydrocarbon-substituted aromatic sulfonates in which two non-aromatic carbon atoms of a hydrocarbon radical introduced by alkylation are linked directly to two adjacent carbon atoms of the aromatic nucleus, said detergent mixture being obtained by chlorinating the hydrocarbon mixture, condensing the resulting mixture with an aromatic compound having a pair of ortho nuclear carbon atoms susceptible to alkylation, and sulfonating the resulting mixture. No. 452,271. Lawrence H. Flett (to Allied Chemical & Dye Corp.).

Detergent composition for cleaning polished surfaces of glass comprising an aqueous solution of 2-methyl-2, 4-pentane diol, and a wetting agent of the alkylated sulfonate type. No. 452,518. Wilmer C. Gangloff (to Drackett Co.).

Surface active compounds by reacting a compound selected from the group consisting of rosin, hydrogenated, dehydrogenated, disproportionated and decarboxylated rosin, the free acids corresponding to rosin and hydrogenated, dehydrogenated, dehydrogenated and disproportionated rosin, and esters, of the aforementioned acids, with a strong sulfonating agent and a compound selected from the group consisting of aliphatic alcohols and alkenes having at least 8 carbon atoms. No. 452,540. Donald Price and Everette L. May (to National Oil Products Co.).

Dyes, Pigments

Dyeing organic textile fibers sensitive to alkalines, with a vat dyestuff which is reducible under acid conditions, which comprises impregnating a mass of the fibers with the vat dyestuff in unreduced form, reducing the vat dyestuff in contact with the fiber in an acid medium having an acidity of less than pH 1, and then oxidizing the reduced vat dyestuff on the fiber to the unreduced form. No. 2,450,767. George K. Plotica (to Allied Chemical & Dye Corp.).

In the dyeing of wool with an indigo by treating the wool with a dye liquor comprising an indigo in the leuco form, sodium hydrosulfite and ammonium hydroxide, the improvement which comprises exhausting the dye liquor by adding thereto an alkali-metal salt selected from the group consisting of the neutral alkali-metal sulfates and the alkali-metal chlorides. No. 2,450,773. Edward Weber (to Allied Chemical & Dye).

Color composition comprising essentially a vat-dye, a quinonyl monoamide of a dicarboxylic acid, the quinonyl radical being selected from the group consisting of the beta-naphthaquinonyl and alpha- and beta-anthraquinonyl radicals, and a urea. No. 2,451,270. Chester Albert Amick and Roy Herman Kienle (to American Cyanamid Co.).

Treatment of pigment comprising calcium carbonate to effect an improvement in at least one of the properties of adhesive requirement, oil absorption and gloss-imparting quality which comprises directing paste comprising said pigment into the path of travel of teeth of a circular saw. No. 2,451,448. Harold R. Rafton (to Raffold Process Corp.).

Aminoanthraquinone dye compounds containing a trifluoromethyl group. No. 2,451,478. Joseph B. Dickey and Edmund B. Towne (to Eastman Kodak Co.).

Canadian

Printing fibrous materials by applying to the latter as a printing agent an emulsion which comprises, as equeous phase, an alkali metal caseinate formaldehyde solution containing not more than 12 per cent of casein and also containing at least one other substance capable of forming with formaldehyde a hardenable aminoplast condensation product, said other substance being selected from the group consisting of urea, thiourea, guanidine, dicyandiamide and melamine, and, as oil phase, an organic liquid which is immiscible with water and which is nonreactive with the equeous phase and the constituents thereof. No. 451,853. Florian Enderlin and Luzius Schibler (to Ciba Ltd.).

Equipment

Vertical heating and circulating tube still. No. 2,449,587. John M. Chambers (to Arthur D. Little, Inc.)

Apparatus for contacting solids and gaseous fluids. No. 2,449,601. Edwin I. Gohr, Homer Z. Martin, and Charles W. Tyson (to Standard Oil Development Co.).

Means for producing uniform fluid mixtures. No. 2,449,766. Clyde A. Brown (to Dole Valve Co.).

Heat exchanger comprising a substantially cylindrical shell, a plurality of conduits within said shell, each conduit being in the form of a substantially right helicoid and said helicoids being concentric and of equal size and pitch and the turns thereof being equally spaced from each other thereby forming a plurality of helicoidal passageways of substantially uniform cross-sectional shape. No. 2,449,822. Lauritz Benedictus Schibbye (to Svenska Cellulosa Aktiebolaget).

Multistage centrifugal pump comprising a pump shaft, an electric motor having its rotor mounted on the pump shaft, a plurality of stages of impellers mounted on said shaft, a casing for said pump enclosing the motor and impellers and having an axial inlet opening at one end for fluid to be pumped, and a series of volutes each enclosing at least one impeller stage, said motor being disposed between different stages of impellers. No. 2,450,137. Anatol J. Harlamoff (to A. O. Smith Corp.).

In a centrifugal pump, impeller having a central axially open liquid intake and having means for ejecting the liquid radially outwardly therefrom, a stationary diffuser surrounding said pump impeller, said diffuser being free to adjust itself relative to said pump casing and being biased against a fixed surface associated with said pump casing to hold the diffuser in position. No. 2,450,143. Giles Philip Eliot Howard and Alexander Ivanoff.

Fluid pressure control valve. No. 2,450,480. John W. Marsh.

Ultraviolet generator embodying a source of short-wave ultraviolet radiation and a fluorescent layer comprising cerium fluoride in which the cerium is present in trivalent form and characterized by resulting radiation in the erythemal ultraviolet when excited by the short-wave ultraviolet radiation. No. 2,450,548. Jacob H. Gisolf, Ferdinand A. Kröger and Jan Bakker (to General Electric Co., Inc.).

Mixer. No. 2,450,802. John Johnson, deceased, by Ethel H. Johnson (to John E. Johnson).

Catalyst chamber construction. No. 2,450,804. John W. Loy (to Phillips Petroleum Co.).

Differential pressure gauge. No. 2,451,425. Aloysius F. Allwein (to The Brown Instrument Co.).

Pipe coupling. No. 2,451,437. Hugh Francis Fenlon (to John J. Dougherty).

Liquid level gauge. No. 2,451,704. Howard L. Wood.

Dust collector. No. 2,451,755. Leonard Lee (to James Howden & Co.).

Multitubular heat exchanger. No. 2,451,786. Eugen Villiger and Eduard Benninger (to Aktiengesellschaft Fuer Technische Studien).

Apparatus for contacting solids with gaseous reactants. No. 2,451,924. John A. Crowley, Jr. (to Socony-Vacuum Oil Co., Inc.).

One-piece combined relief pump valve and by-pass valve seat. No. 2,451,925. Russell R. Curtis (to Curtis Pump Co.).

Canadian

Evaporating system. No. 451,766. Carl John Lockman (to Aktiebolaget Rosenblads Patenter).

Rotary pump comprising a one-piece casing forming a chamber for housing rotatable blades, clearance means within said casing through which said blades are assembled into said chamber, said means comprising radial slots. No. 451,855. Sanford F. Clifton (to Crosley Motors, Inc.).

Dispersing agitator comprising a driving shaft having a free end extending downwardly into said liquid contents, means for attachment to said shaft, supporting means extending radially from said attaching means, and a series of unshrouded blades mounted in circumferentially spaced relation on said supporting means, each of said blades having radially extending opposite sides diverging from each other from the leading toward the trailing edge of the blade to form currents flowing in radial and opposite axial directions and in said contents and a dispersing cavitation zone in rear thereof. No. 451,893. Frank D. Miller (to Mixing Equipment Co., Inc.).

Bowl liner for gyratory crushers and means for securing it. No. 451,898. Oscar Clemens Gruender (to Nordberg Mfg. Co.).

Apparatus for heat exchange between liquids. No. 451,975. Torsten Ramen.

In a pipe coupling the combination of cooperating clamping sections interfitted with each other, sealing members secured to each of said clamping sections, one of said clamping sections having ears with openings therein, between which ears the other clamping member extends, a key adapted to extend through the openings in the said ears, and a flexible member secured to one of the clamping sections and movably connected with the other clamping section and the key. No. 452,028. William S. Drinkwater (to Drinkwater, Inc.)

Dust collector. No. 452,087. Roland L. Lincoln (to Westinghouse Electric Corp.)

In a self-priming centrifugal pump a peeler blade disposed within the reservoir and chamber for cooperation with the impeller to increase the priming efficiency of the pump. No. 452,140. Charles Irving Longenecker and Gilbert William Quast (to Chain Belt Co.).

Suction filter. No. 452,267. Johan Christopher Fredrik Carl Richter (to Aktiebolaget Kamyr).

Rotary drum filter. No. 452,344. Thomas R. Komline (to Komline-Sanderson Engineering Corp.).

Pulverizing mill. No. 452,492. Richard Henry Evans (to Babcock & Wilcox Co.).

Explosives

Delay powder which is substantially non-gaseous and non-explosive including a metallic chromate, a metal, and a solid non-metallic element selected from the group consisting of sulphur and phosphorus, said chromate and said metal being present in a finely divided state. No. 2,450,892. George C. Hale.

Explosive containing magnesium, calcium, phosphide and potassium perchlorate. No. 2,451,864. Daniel P. O'Brien.

Canadian

Preventing the caking of explosive compositions containing ammonium nitrate by coating the ammonium nitrate particles with a finely divided material taken from the group consisting of the difficultly soluble inorganic silicates and precipitated silica. No. 451,841. Richard Clyde Glogau (to Canadian Industries, Ltd.).

Priming mixture for ammunition containing lead styphnate and a salt of triazoactic acid, said salt being that of a metal from the group consisting of potassium, silver, lead and uranyl. No. 451,908. Philip Hawley Burdett and Gordon Maxwell Calhoun (to Remington Arms Co., Inc.).

Food

Subjection of flour to the action of SO_3 gas in the presence of steam. No. 2,450,260. Herbert Horace Ward.

In a method of decolorizing vegetable oil, the step which comprises contacting such an oil with a decolorizing composition prepared by treating particles of hydrated magnesium silicate adsorbent material with a water-soluble ferric salt in aqueous solution to cause said ferric salt to become intimately associated with the particles of said material and then drying. No. 2,450,549. Alexander Greentree (to Lyle Caldwell).

In a method of removing undesired flavoring constituents from plasmolyzed yeast products in the liquid state, the steps which comprise agitating said liquid yeast products with a normally solid higher molecular weight fatty acid partial ester of an aliphatic polyhydroxy substance. No. 2,450,604. Ben Maizel (to Vico Products Co.).

Process for refining sucrose solutions containing organic acids, which comprises dispersing in a sucrose solution a refining agent comprising finely divided particles of conjointly prefused lime and clay, the quantity of lime present being greater than that required to neutralize the organic acids present, heating to form reaction products by reaction between the lime and the organic acids without appreciable inversion of sucrose to glucose, and separating said reaction products with the particles of the refining agent. No. 2,450,683. Ernest E. Pittman.

Concentrating liquid food products, which comprises rapidly flowing the liquid food product in a thin film over a heat exchange surface under high vacuum. No. 2,450,774. George G. Zahm (to Hurd Corp.).

Concentrating eggs in the liquid phase which comprises breaking and thoroughly mixing whole fresh eggs to form a substantially uniform liquid, and passing such liquid vertically through an evacuated chamber at a relatively high rate of speed and in a relatively thin continuous film while subjecting it to mechanically applied pressure. No. 2,450,775. George G. Zahm (to Hurd Corp.).

Apparatus for extracting vegetable oil. No. 2,451,081. Lester L. Ford.

Manufacture of a water soluble pure egg albumin from the solution adhering to the egg shells after the dumping of the eggs comprising treating the juice with a mixture of water insoluble terpineols, dissolving the egg yolk and egg yolk oil in the alcohol and separating the alcoholic egg yolk solution from the aqueous albumin solution. No. 2,451,116. Frederick F. Pollak.

Activation of anion exchangers in sugar purification by contacting said resin with an aqueous solution containing a strong acid selected from the group consisting of hydrochloric acid and sulfuric acid and regenerating said resin with an alkaline substance. No. 2,451,272. William A. Blann (to American Cyanamid Co.).

Starch product soluble in cold water, the solution of which when moderately heated will produce soluble starch derivatives of the group comprising starch ethers and starch esters consisting of a dry mixture of cold swelling starch, a reagent of the group comprising etherifying and esterifying agents and the proportion of alkaline substance necessary for effecting the reaction. No. 2,451,686. Fredrik André Möller and Ján Lolkema (to Naamlooze Vennootschap).

Inhibiting the iodoform taste sometimes encountered in shrimp which includes the step of treating shrimp with chlorine dioxide. No. 2,451,897. Eric R. Woodward (to Mathieson Chemical Corp.).

Canadian

Fish reduction process comprising treating the fish with a mixture of sodium bisulfate in combination with ferrous sulfate and aluminum sulfate just before the fish enter the cooker. No. 452,228. George Rufus Henshall.

Protecting fish oils and associated oxidizable substances such as vitamins against oxidation prior to and during extraction thereof which comprises intimately associating the fish tissues with an active oxygen absorber such as sodium sulfite. No. 452,315. Kenneth C. D. Hickman (to Distillation Products, Inc.).

Decolorizing vegetable phosphatides by mixing with an aqueous solution of sodium chlorite. No. 452,566. Robert Edman Greenfield (to A. E. Staley Mfg. Co.).

Inorganic

Crystalline product composed of fine crystals having a molecular ratio of Na_2O to SiO_2 of from 1:4.3 to 1:4.5 and containing approximately 2 to 4 molecules of water. No. 23,043. Walter F. Wegst and John H. Wills (to Philadelphia Quartz Co.).

In a process for recovering sulphur dioxide from sulphur dioxide-containing gases the steps of adding solid sodium acid fluoride to a solution of ammonium bisulfite under conditions regulated to evolve sulphur dioxide and form solid sodium fluoride and a solution containing ammonium fluoride, recovering the evolved sulphur dioxide, separating the solid sodium fluoride from the solution containing the said ammonium fluoride, partially evaporating the said solution to vaporize water and ammonia and form a solution containing ammonium fluoride, recovering the vaporized ammonia, contacting the said ammonia with sulphur dioxide-containing gas in the presence of water to form an additional quantity of ammonium bisulfite solution, contacting the solution containing the acid fluoride with solid sodium fluoride to reform the solid sodium acid fluoride and a fluoride solution of diminished acidity, separating the solid sodium acid fluoride from the fluoride solution and returning the said solution to the evaporation operation. No. 2,449,537. Arthur W. Hixson and Ralph Miller (to The Chemical Foundation, Inc.).

Continuous process for producing hydrogen by reacting steam with metalliferous reducing agents. No. 2,449,635. Frank T. Barr (to Standard Catalytic Co.).

Preparation of spheroidal silica-alumina gel particles. No. 2,449,664. Milton M. Marisic (to Socony-Vacuum Oil Co., Inc.).

In the process of making an alumina sol from amalgamated metallic aluminum by the action of a dilute weak acid capable of forming a sol with said amalgamated aluminum, the improvement comprising charging said aluminum to a reaction zone and amalgamating it therein by flooding with a solution of a mercury salt withdrawing said mercury salt solution, flooding the resulting amalgamated aluminum with dilute weak acid. No. 2,449,847. Llewellyn Heard (to Standard Oil).

Ammoniated acid activated montmorillonite catalyst having ammonium ions in the base exchange positions of said montmorillonite. No. 2,449,891. Wright W. Gary and Robert B. Secor (to Filtrol Corp.).

Obtaining nitrogen tetroxide in relatively pure form which comprises bringing nitrogen oxides into contact with sulfuric acid, introducing the resulting mixture into a preheater, passing nitric acid into said preheater, introducing the mixture thereby formed into a denitrating tower passing steam countercurrent to the aforesaid mixture and in direct heat exchange therewith, condensing and refluxing the evolved nitric acid and water vapors into said tower causing said nitric acid to react with and oxidize the NO present to nitrogen tetroxide while simultaneously becoming reduced itself to nitrogen tetroxide, subsequently condensing the evolved nitrogen tetroxide and liquefying and separating the same. No. 2,450,105. George Washington Batchelder and Albert W. Hawkins (to E. I. du Pont de Nemours & Co.).

In a process of preparing titanium dioxide by reaction of oxygen with vaporized titanium tetrachloride while minimizing crystal formation by conducting the reaction out of substantial contact with hot surfaces, the steps which comprise injecting a portion of a stream of vaporized titanium tetrachloride into a reaction zone through a nozzle, diffusing a further portion of said stream transversely to the direction of flow thereof through the nozzle wall and into the reaction zone, and injecting a countercurrent stream of preheated oxygen into the reaction zone and into contact with the portion of the vaporized titanium tetrachloride stream issuing from the nozzle; the portion of the vaporized titanium tetrachloride stream issuing from the nozzle and the oxygen stream being so regulated as to meet at a point remote from the bounding surfaces of the reaction zone. No. 2,450,156. Alphonse Pechukas (to Pittsburgh Plate Glass Co.).

Preparing palladium oxide on a refractory support, including mixing the support with an aqueous solution of palladium and silver nitrates, evaporating the water from the result and heating it to temperatures above the decomposition temperature of palladium nitrate and below the decomposition temperature of silver nitrate for a sufficient time to decompose a substantial portion of the palladium nitrate to palladium oxide and subjecting this result when cooled to the action of a solvent of the silver nitrate but not of the palladium oxide to dissolve the former from the latter and to leave a deposit of the palladium oxide on said support. No. 2,450,176. Herbert E. Zshiegner (to Emanuel Honig).

Producing hydrides of alkali metals which comprises heating the anhydrous hydroxide of an alkali metal with a reducing metal in a reaction zone in the absence of air. No. 2,450,266. Peter P. Alexander (to Metal Hydrides, Inc.).

Separating oxygen from air by means of a chelate compound. No. 2,450,276. Benjamin B. Fogler and Leroy F. Marek (to Arthur D. Little, Inc.).

Making spheroidal solid contact catalysts of high physical strength. No. 2,450,394. Henry Trueheart Brown and Rodney V. Shankland (to Standard Oil Co.).

Method of cleaning equipment which has been employed in contact with a zirconia gel during the drying of said gel which comprises washing said equipment with a caustic alkali solution containing at least one gram of dissolved silica therein per 100 cc. of solution at a temperature below 70° C. No. 2,450,439. Thomas H. Milliken, Jr. (to Houdry Process Corp.).

Cementitious material possessing superior water resistance and strength comprising a magnesium oxychloride cement containing a finely divided cupreous powder, the major portion of whose particles are of a size of the order of a few microns, said cupreous powder comprising essentially metallic copper particles having protective cuprous oxide films and a substantial proportion of cuprous oxide, said cupreous powder being present in an amount substantially less than the amount of the cement. No. 2,450,513. Dean S. Hubbell (to H. H. Robertson Co.).

Means for directing hydrogen chloride gas into chamber for deoxidizing metal sheet edge portions passing therethrough. No. 2,450,669. Alfred L. Kronquest (to Continental Can Co., Inc.).

An aluminum oxide which has been sulfamic treated for a period of time sufficient to give a product which after calcining at 300° C. to 600° C. contains less than 0.2% sodium. No. 2,450,766. Alan C. Nixon and Orris L. Davis (to Shell Development Co.).

Dry cement mixture comprising water-soluble aluminum phosphate ranging from mono- to di-aluminum phosphate and a magnesium compound from the group consisting of magnesia, olivine, magnesium silicate, and mixtures thereof. No. 2,450,952. Herbert H. Greger.

Preparing a catalyst for use in effecting isomerization of normal paraffins which comprises bringing together liquid hydrogen fluoride, and boron trifluoride in contact with a normal paraffin and an olefin. No. 2,451,018. Robert E. Burk (to The Standard Oil Co.).

Making a co-precipitated aluminum-chromium-molybdenum gel type oxide catalyst by mixing a solution of an alkali metal aluminate and an acidic solution of chromium salt and ammonium paramolybdate. No. 2,451,471. Robert E. Burk and Everett C. Hughes (to The Standard Oil Co.).

Forming a luminescent screen on a solid surface, which comprises the steps of providing a colloidal silica gel, distributing an aqueous dispersion of luminescent material upon said colloidal silica gel, allowing said luminescent material to settle through said colloidal silica gel and deposit upon said surface. No. 2,451,590. Stephen Tidik and Albert Steadman (to Allen B. Du Mont Laboratories, Inc.).

In the generation of chlorine dioxide, the improvement which comprises reacting dry nitrogen peroxide with a solution of chloric acid in aqueous nitric acid. No. 2,451,826. John F. Haller (to Mathieson Chemical Corp.).

Continuous process for the preparation of chlorine directly from hydrogen chloride without any intermediate formation of chlorides on the catalyst, which consists in passing hydrogen chloride gas over a catalyst mass in an oxygen-containing gas, said catalyst mass containing chromium sesquioxide supported on titania gel, until the rate of production of chlorine decreases as the catalyst mass becomes spent, then passing air over the spent mass and repeating the cycle. No. 2,451,870. Roger W. Richardson and Jerry A. Pierce (to Standard Oil Development Co.).

Preparing water-soluble substantially anhydrous neutral aluminum sulfate by preparing a solution of neutral aluminum sulfate containing at least 15% Al_2O_3, maintaining said solution at a temperature not less than 75° C. and above that temperature at which the amorphous solid solution of neutral aluminum sulfate will form for at least 3 hours and until the solution has finally set to a readily disintegratable solid mass of crystals of substantially the same mass as the original solution, and then dehydrating the resulting crystals to the anhydrous state. No. 2,452,024. William S. Wilson (to Monsanto Chemical Co.).

Canadian

Oxidizing sulphur dioxide to sulphur trioxide with oxygen in the presence of a supported catalyst comprising a carrier having deposited thereon a thin layer of platinum and palladium. No. 451,775. Edgar F. Rosenblatt and Louis Pollen (to Baker & Co., Inc.).

Composition of matter comprising a silicic acid sol and a water-soluble ether, wherein the carbons attached to the same ether oxygen are not directly attached to each other. No. 451,799. Joseph S. Kirk (to Canadian Industries, Ltd.).

Fuel for internal combustion engines comprising ammonium nitrate dissolved in liquid ammonia. No. 451,801. Clyde Oliver Davis (to Canadian Industries, Ltd.).

Process for preparing an improved durable catalytic composition containing mercury oxide at least partially combined chemically with an oxide of nitrogen, comprising impregnating charcoal with a mercury nitrate solution, roasting the resulting product until free mercury appears in the exit of the reaction zone and then cooling and recovering the resulting catalytic composition. No. 451,826. Leroy Frank Salisbury (to Canadian Industries, Ltd.).

Copper acetylide catalyst material consisting of particles of a catalyst support having a size not to exceed 300 mesh and, uniformly distributed therein, said copper acetylide, said catalyst material containing not to exceed 20 per cent by weight of said copper acetylide. No. 451,843. Joseph Frederic Walker and Thomas Edward Londergan (to Canadian Industries, Ltd.).

In a process of extracting alumina of high purity from low grade alumina-bearing ore, including sintering of the ore with quantities of alkaline earth compound and alkali metal compound proportioned to solubilize the alumina values thereof and leaching the sinter thus formed to produce leach liquor containing soluble alumina values, the improvement comprising forming a slurry composed of bauxite, caustic liquor, and said leach liquor, digesting said slurry under pressure to form an alumina-rich solution and thereafter precipitating alumina values from said solution. No. 451,986. Ralph Waldo Brown (to Aluminum Co. of Amer.).

A cyclic process of extracting silica-free alumina from bauxite including pressure digestion of bauxite with caustic liquor and with an alkali metal aluminate solution containing soluble silica, separation of the alumina-rich solution thus formed from insoluble residues, sintering of the insoluble residues with proportioned quantities of alkaline earth compound and alkaline metal compound, leaching of the resulting sinter to extract therefrom soluble values thus forming an alkali metal aluminate solution containing soluble silica and return of the said solution to the pressure digestion. No. 451,987. Ralph Waldo Brown (to Aluminum Co. of Amer.).

Generating a mixture of chlorine and chlorine dioxide, absorbing a substantial portion of chlorine and substantially all of the chlorine dioxide in water and utilizing in the multi-stage bleaching of a cellulosic material. No. 452,351. Harry N. Tatomer (to Mathieson Alkali Works).

Amination catalyst comprising cobalt in suspension on a carrier of hydrated magnesium silicate. No. 452,382. John W. Teter (to Sinclair Refining Co.).

Medicinal

Physiologically active compound comprising a compound from the group consisting of compounds having the general formula $R_1NHCH_2CONHR_2$ where R_1 stands for an aralkyl having 3 carbon atoms in the alkyl chain and R_2 stands for a diarylalkyl; and the non-toxic salts of said compounds. No. 2,449,638. William F. Bruce and Joseph Seifter (to Wyeth, Inc.).

Liquid solution for oral or parenteral use comprising riboflavin in solution in a liquid medium selected from the group consisting of water and propylene glycol, and a monohydroxy, monoalkoxy benzaldehyde solubilizing agent, the monoalkoxy group containing not more than 5 carbon atoms therein. No. 2,449,640. Jesse Charney (to Wyeth, Inc.).

In a process for the extraction and isolation of substantially pure crystalline digitoxin from crude sources, the steps comprising extracting digitalis leaves with a mixture comprising a major amount of a lower alcohol and a minor amount of water. No. 2,449,673. Harry Rosen (to Wyeth, Inc.).

Therapeutic agents consisting ofaminoalkyl 9,10-dihydoranthryl ketones and salts thereof with acids. No. 2,450,122. John W. Cusic (to G. D. Searle & Co.).

Improvement in the production of rutin from plant materials containing it which comprises treating the crude material with water in the presence of a water-soluble borate. No. 2,450,555. Harold Freeman Koones (to S. B. Penick & Co.).

Preparting optically active penicillamine which comprises formylating diisopropylidenepenicillamine to produce N-formyl-isopropylidenepenicillamine, reacting this substance with an optically active alkaloid which forms the optical isomers of N-formyl-isopropylidene-penicillamine crystalline compounds of different solubility, fractionally crystallizing these compounds from a solution to effect resolution and treating at least one of the crystalline compounds so obtained with a hydrolyzing agent to produce an optically active penicillamine. No. 2,450,784. Walter Mark Duffin and Samuel Wilkinson (to Therapeutic Research Corp. of Great Britain, Ltd.).

Therapeutic product consisting of a methyl-glucamine complex of rutin. No. 2,451,772. Mikhail B. Plungian (to Temple University).

As a therapeutic agent, a synthetic vicinal alkyl pyrocatechol having 10 to 18 carbon atoms in the alkyl group, and a carrier. No. 2,451,955. Harry Keil, Charles R. Dawson and David Wasserman.

Canadian

Converting an isolated mass consisting essentially of a compound selected from the group consisting of isodehydro-cholesterol and its esters into provitamin material which comprises heating said mass to produce the corresponding 7-dehydro-cholesterol compound. No. 451,844. James Allan Callan (to Canadian Industries, Ltd.).

Metals, Ores

Applying directly to a ferrous metal cathode a coating of silver comprising placing said ferrous metal cathode in an aqueous bath having sodium cyanide, silver cyanide, sodium chloride, potassium carbonate, placing an iron anode in said bath and passing an electrical current of a value between 30 to 200 amperes per square foot of surface area of the cathode, between said anode and cathode. No. 2,449,726. Alfred Daniel Slatkin (to Arthur F. Cutten).

Recovering magnesium by reduction which comprises reducing a siliceous initial material with carbonaceous matter at a temperature at which SiO is liberated in the form of vapor while allowing the gaseous reaction products to escape into a non-oxidizing atmosphere, passing the SiO-vapor and CO-gas mixture into intimate contact with a magnesia-containing material which is cold enough for the SiO-vapor to condense therein and while the accompanying CO-gas is caused to pass off; and then heating the reduction charge thus prepared to reduction temperature and condensing the magnesium vapor disengaged. No. 2,450,057. Richard Reik.

Alloy wire for metal evaporation composed of about .04 per cent phosphorus, 5 per cent platinum and the balance of silver. No. 2,450,340. Franz R. Hensel and Earl I. Larsen (to P. R. Mallory & Co., Inc.).

Recovering iron from ores consisting essentially of iron oxides and silica, which comprises mixing the ore with sufficient carbonaceous material to effect reduction of the iron oxides and sufficient calcium oxide yielding material to provide a CaO to SiO_2 ratio in the starting mixture that lies in a range of from 1.5 parts to 3.0 parts of CaO to 1 part of SiO_2 by weight, forming the mixture into compact shapes, subjecting the shapes to a temperature of approximately 2900° F. whereby the iron oxides are reduced to iron and formed into globules in a matrix substantially alpha calcium orthosilicate, cooling the resulting mass to atmospheric temperature to invert the calcium orthosilicate from its alpha form through its beta form and finally to its gamma form whereby during the latter inversion there is such a significant increase in volume that the matrix disintegrates into discrete particles, and recovering the iron. No. 2,450,343. John J. Howard and Harold A. Heiligman (to E. J. Lavino and Co.).

In the electrolytic refining of nickel, in which the impure nickel electrolyte, coming from the cell is subjected to cementation and neutralization with nickel until the electrolyte is only slightly acid to remove copper and arsenic; the solids are separated from the electrolyte; the electrolyte is aerated to precipitate practically all of the iron as ferric hydroxide, which carries with it a substantial amount of the impurities lead, arsenic and copper; the improvement which comprises subjecting the purified nickel electrolyte to the additional purifying action of ferric hydroxide especially prepared outside of the electrolyte by wet precipitation, the ferric hydroxide being introduced while still wet from the precipitation into the electrolyte in amount sufficient to adsorb thereon a substantial amount of the remaining impurities lead, arsenic and copper, the acidity of the electrolyte being insufficient to dissolve the ferric hydroxide, separating the ferric hydroxide and its adsorbed residual impurities from the electrolyte, and subjecting the electrolyte thus purified to electrolysis to produce nickel cathodes of high purity. No. 2,450,426. Anton Martin Gronningsaeter and Bertin G. Hommeren (to Falconbridge Nickel Mines, Ltd.).

Beneficiating a ferruginous chert whose oxidic iron content is largely magnetite which comprises adding to an aqueous pulp of the chert an agent of the group consisting of alkaline-acting alkali metal compounds, ammonium hydroxide and ammonium carbonate to make said pulp at least as alkaline as pH 8, and subjecting the alkaline pulp to cationic froth flotation treatment using a frother and as cationic collector a water-soluble form of an aliphatic amine whose aliphatic radical corresponds in length to that of a fatty acid of coconut oil, whereby to obtain a siliceous froth product poor in magnetite and an underflow concentrate containing most of the magnetite. No. 2,450,720. Fred D. De Vaney (to Erie Mining Co.).

Solder for aluminum consisting only of manganese; aluminum (pure); magnesium; copper; bismuth (metallic); zinc; and tin. No. 2,450,778. Henri M. Boonen (to Thomas J. Melancon).

Electrodepositing tin by providing a tin anode in an electrolyte, making the article upon which the tin is to be deposited the cathode in such electrolyte, the electrolyte consisting of an aqueous solution of tin, phenol sulphonic acid, dihydroxy diphenyl sulphone, and monobutyl phenylphenol sodium monosulphonate and passing an electric current between the anode and cathode. No. 2,450,794. Elmer F. Harris (to Carnegie-Illinois Steel Corp.).

Electrolyte for deposition of tin consisting of an aqueous solution of tin, an acid of the group consisting of phenol sulphonic acid, sulphuric acid, fluo-silicic acid, benezene sulphonic acid, cresol sulphonic acid, chlorobenzene sulphonic acid and nitrobenzene sulphonic acid. No. 2,450,795. Elmer F. Harris (to Carnegie-Illinois Steel Corp.).

Extracting manganese from ore containing manganese dioxide by treating with a mixture of sulfuric acid and a material composed of a major portion of cellulose whereby the manganese in said ore is transformed into manganous sulfate. No. 2,450,870. Charles C. Daugherty (to Chatham Chemical Co.).

In the method of electroplating a metal from the group consisting of iron, lead, indium, platinum, osmium, rhodium, iridium, palladium, ruthenium and alloys in which these metals predominate, on a base member from an aqueous electrolyte having the metal to be plated dissolved therein, the steps comprising applying a plating electric current to the base member to electroplate an increment of the metal, then applying a deplating electric current to the base member to deplate a substantial portion of the previously plated increment, and continuing the alternate plating and deplating until a desired thickness of the metal is applied to the base member. No. 2,451,340. George W. Jernstedt (to Westinghouse Electric Corp.).

Electroplating metal from the group consisting of copper, brass, silver, zinc, tin, cadmium and gold on a base member. No. 2,451,341. George W. Jernstedt (to Westinghouse Electric Corp.).

Electrodepositing zinc from an aqueous zinc cyanide solution containing the condensation product of sodium cyanamide and formaldehyde obtained by reacting substantially equimolecular amounts of sodium cyanamide and formaldehyde. No. 2,451,426. Robert R. Bair, Harry L. Benner and Joseph Frederic Walker (to E. I. Du Pont de Nemours & Co.)

In the electrolytic production of aluminum from alumina dissolved in a fluoride fusion, the improvement which comprises circulating an alumina-containing fluoride fusion consisting essentially of the fluorides of sodium and aluminum through a series of cells in a cycle manner. No. 2,451,490. Arthur F. Johnson (to Reynolds Metals Co.).

In the electrolytic production of aluminum from alumina dissolved in a fluoride fusion, the improvement which comprises circulating alumina-containing fluoride fusion, dissolving alumina in an alumina-replenishing zone and in the presence of carbon into contact with a charge of material consisting essentially of alumina but also including impurities of the group consisting of combined iron, silicon and titanium. No. 2,451,491. Arthur F. Johnson (to Reynolds Metals Co.).

In the electrolytic production of aluminum from alumina dissolved in a fluoride fusion, the improvement which comprises circulating an alumina-containing fluoride fusion, transferring the alumina-depleted fusion by bringing said fusion into contact with a charge of impure alumina-containing feed material having oxidic impurities, including the oxides of iron, silicon and titanium, and carbon and aluminum as reducing agents. No. 2,451,492. Arthur F. Johnson (to Reynolds Metals Co.).

In the electrolytic production of aluminum from a fusion of cryolite containing dissolved alumina, the improvement which comprises circulating the alumina-containing fusion through an electrolytic cell in which it is subjected to electrolysis, transferring the fluoride fusion depleted in alumina from the cell to an alumina-replenishing zone having a plurality of separate but connected stages by bringing into contact with a charge of alumina-containing feed material having oxidic impurities, including the oxides of iron, silicon and titanium, and carbon as a reducing agent in one stage, selectively reducing a part of the iron oxide in said stage, passing the alumina-enriched fusion through a carbon filter to reduce iron oxide not reduced in first stage and into a second stage mixing metallic aluminum with the fusion in said second stage to reduce the silicon and titanium oxides collecting the reduced silicon and titanium oxides, collecting the reduced silicon and titanium with a molten alloying agent from the class consisting of iron and ferroaluminum, withdrawing the alumina-enriched fusion from said second stage, reducing the temperature of the fusion and passing into the electrolytic cell. No. 2,451,493. Arthur F. Johnson (to Reynolds Metals Co.).

In the electrolytic reduction of alumina from cryolite-containing fusions of alumina, the improvement which comprises withdrawing alumina-depleted fusion from the electrolytic reduction operation, adding crude bauxite containing oxidic impurities including iron oxide to a portion of the withdrawn alumina-depleted fusion, heating the enriched fusion in contact with a reducing agent from the class consisting of aluminum, aluminum alloys and carbon, mixing the alumina-enriched fusion from which the molten iron was separated with another portion of the withdrawn alumina-depleted fusion, passing the latter fusion through a carbon filter and back into the electrolytic reduction operation. No. 2,451,494. Arthur F. Johnson (to Reynolds Metals Co.).

Creep resistant and heat resistant austenitic chromium-nickel-iron alloy comprising chromium, columbium, molybdenum, carbon, balance iron. No. 2,451,547. Howard M. German (to Driver-Harris Co.).

In the method for recovering manganese from manganese bearing ores containing silica, the step of treating an ore pulp mass including a sulfuric acid containing manganese sulfate solution which contains silica in a dissolved and dispersed state with a basic material capable of forming a precipitate upon reaction with said acid. No. 2,451,647. John R. Allen (to Manganese Products, Inc.).

Bearing alloy consisting of copper, silver and lead in equal proportions. No. 2,451,907. Walter Betteridge and Ernest Reginald Gaddd (to The Bristol Aeroplane Co., Ltd.).

Canadian

Smelting sulphide bearing, especially copper or nickel bearing materials, such as flotation concentrate so that a product in liquid state is obtained as a reaction product, characterized thereby that the heat requisite for smelting the raw material is attained by allowing the pulverized raw material and the pre-heated air regulated to a specified amount sufficient for the reactions and conducted from the top downwardly to react with each other in the direction of flow and by permitting the flue gas to flow in the same direction as the raw material and oxidizing air. No. 451,735. Petri Baldur Bryk and Johan Wilhelm.

Continuous process for chlorinating iron titanium ore by forming a pervious bed containing ore and carbon passing chlorine through said bed, maintaining the temperature above about 600° C., withdrawing vaporized chlorides from the surface of said bed, introducing a further quantity of fresh ore and carbon and regulating the rate of introduction of ore to insure a bed of ore at least about 6 inches dept. No. 451,903. Irving Elkin Muskat and Robert Hull Taylor (to Pittsburgh Plate Glass Co.).

Continuous process of chlorinating a titanium ore by chlorinating said ore in the presence of sufficient gaseous reducing agent to cause formation of iron chloride and a major quantity of titanium tetrachloride in the reaction zone of a reactor and introducing chlorine, gaseous reducing agent and ore therein at such a rate that the heat evolved by the chlorination reaction is developed with sufficient rapidity to maintain the temperature above 600° C. within at least a portion of said zone without externally heating said zone, whereby iron and titanium chlorides are formed and volatilized. No. 451,904. Irving Elkin Muskat and Robert Hull Taylor (to Pittsburgh Plate Glass Co.).

An alloy comprising tin, antimony, silver, at least one of the metals selected from the group consisting of arsenic, zinc, nickel, copper, cadmium, and aluminum, balance substantially all lead. No. 451,994. Walter P. Carroll and Dimitries S. Kondrat (to Canada Metal Co., Ltd.).

Silver-thallium bearing. No. 452,183. Franz R. Hensel (to P. R. Mallory & Co., Inc.).

Bearing formed of thallium and copper. No. 452,184. Franz R. Hensel (to P. R. Mallory & Co., Inc.).

In the anodic polishing of silver, copper, cadmium, alloys consisting of these metals, brass and nickel silver, in cyanide baths, the improvement which comprises subjecting the surface to be polished to electrolytic action in an electrolyte containing in solution a simple alkaline metal cyanide in excess of any complex cyanide of the metal to be polished. No. 452,364. Samuel E. Eaton (to Oneida, Ltd.).

Refining aluminum containing silicon and a metal which forms with a material which is more insoluble in aluminum than silicon by heating with lead. No. 452,446. Gustaf Newton Kirsebom.

In a process of producing nickel and nickel-containing metallic products from sulfur-containing material that improvement which comprises removing at least part of the sulfur by treating a molten mass of said sulfur-containing material under a fluoride slag with a soluble metallic agent containing at least one element from the group consisting of calcium and magnesium. No. 452,531. Clarence George Bieber, Bengt Edward Ernst Franke and Walter Franklin Sumpter (to International Nickel Co. of Canada, Ltd.).

Organic

Quantitative determination of unsaturated aliphatic aldehydes by titrating a solution of said unsaturated aliphatic aldehyde in an inert organic solvent containing a double bond addition catalyst with a standardized solution of bromine dissolved in said inert organic solvent until the reaction of bromine with the aldehyde ceases, as indicated by the persistence of the yellow color of bromine in the solution for an appreciable length of time. No. 2,449,581. Joseph E. Bludworth, Max O. Robeson and Harry A. Truby, Jr. (to Celanese Corp. of America).

Production of benzonitrile by heating a reaction mixture containing hydrocyanic acid gas and vapors of a compound from the group consisting of benzene and diphenyl. No. 2,449,643. John N. Cosby (to Allied Chemical & Dye Corp.).

Production of an aryl alkyl amine which comprises reacting styrene with dibutylamine in the presence of a catalyst comprising essentially the reaction product of metallic sodium with dibutylamine. No. 2,449,644. Joseph D. Danforth (to Universal Oil Products Co.).

Extract consisting of a fluorinated solvent from the class consisting of $CHClF_2$ and C_2HClF_4 and the parts of pyrethrum flowers soluble therein. No. 2,449,671. William W. Rhodes (to Kinetic Chemicals, Inc.).

Preparation of a thiccyanate salt of an amidine by heating a dinitrile with ammonium thiocyanate. No. 2,449,724. Wallace Frank Short and Maurice William Partridge.

Catalytic synthesis of compounds of the class consisting of hydrocarbons and oxygenated hydrocarbons by the reduction of a carbon oxide with hydrogen, which comprises passing synthesis gas containing essentially carbon oxide and hydrogen, under reaction conditions, in contact with a catalyst mass containing a metal of the iron group having a minor proportion of tellurium alloyed therewith. No. 2,449,775. Wealtha Eloise Hendriksen (to Hydrocarbon Research, Inc.).

Separation of unsaturated hydrocarbons from a hydrocarbon mixture by contacting said hydrocarbon mixture with a solution of a silver salt of a sulfonated aromatic compound in a phenol and a material chosen from the group consisting of water and ethylene glycol. No. 2,449,793. Mott Souders, Jr., and Frederic A. French (to Shell Development Co.).

Aliphatic nitroalcohol ester of acrylic acid. No. 2,449,804. Gaetano F. D'Alelio and James W. Underwood (to General Electric Co.).

Resolving an azeotropic mixture of trimethylchlorosilane and tetrachlorosilane which comprises treating with zinc fluoride to convert the trimethylchlorosilane to trimethylfluorosilane, and separating trimethylfluorosilane from the treated mixture by distillation. No. 2,449,815. Arthur E. Newkirk (to General Electric Co.).

Preparing organo halogenosilanes which comprises separately introducing into a vertical reaction chamber (1) an alkyl chloride gas and (2) a finely divided mixture of silicon and a metallic catalyst for the reaction between silicon and an alkyl chloride gas, said alkyl chloride being introduced into said reaction chamber substantially continuously. No. 2,449,821. Jesse E. Sellers and John L. Davis (to General Electric).

N-nitro-N-methyl hydroxyacetamide nitrate. No. 2,449,843. William Frederick Filbert (to E. I. du Pont de Nemours & Co.).

Preparing alpha-hydroxy-ethyl-2,5-dichlorobenzene by reacting alpha-chlorethyl-2,5-dichlorobenzene with caustic alkali while dissolved in a lower aliphatic alcohol. No. 2,449,877. Thomas S. Carswell and Ralph F. Hayes (to Monsanto Chemical Co.).

In the catalytic oxidation to a pyridine carboxylic acid of an N-heteroaryl compound containing a pyridine nucleus and containing an oxidizable organic grouping attached to the nitrogen-containing aromatic nucleus by at least one carbon-to-carbon linkage, the improvement which comprises conducting the oxidation by reacting nitric acid with a solution containing the N-hetero-aryl compound and a relatively small amount of a substance selected from the group consisting of selenium and a selenium compound dissolved in sulfuric acid, and recovering a compound containing the pyridine carbóxylic acid radical. No. 2,449,906. Max B. Mueller (to Allied Chemical & Dye Corp.).

Preparation of 2-amino-4-methyl-pyrimidine which comprises condensing 1-butynone-3 with a guanidine salt, and recovering the 2-amino-4-methyl pyrimidine produced in the said condensation. No. 2,449,908. Charles Prevost (to Societe Des Usines Chimiques Rhone-Poulenc).

Preparing hydrochloride salts of higher molecular weight aliphatic carboxylic acid esters of alcohol non-tertiary amines, substantially free of amides of said carboxylic acids with said amines, which comprises reacting a higher molecular weight aliphatic carboxylic acid acyl chloride and a hydrochloride of an alcohol non-tertiary amine in the presence of an acid catalyst. No. 2,449,926. Frank J. Cahn (to The Emulsol Corp.).

Producing a phosphorus-and sulfur-containing organic reaction product which comprises reacting a halogenated aliphatic hydrocarbon having at least 18 carbon atoms with a phosphorus sulfide at an elevated temperature for a period of time to achieve the highest sulfur and phosphorus contents in said organic reaction product; the improvement which includes reacting said halogenated aliphatic hydrocarbon with said phosphorus sulfide at an elevated temperature in the presence of a Friedel-Crafts catalyst and for a period of time appreciably less than that required when the reaction is effected in the absence of a Friedel-Crafts catalyst. No. 2,449,933. John J. Giammaria (to Socony-Vacuum Oil Co., Inc.).

In the process of preparing new synthetic compositions from mono-silanes having 3 mono-valent hydrocarbon radicals attached to each silicon atom through carbon-silicon linkages, the remaining valence of each silicon atom being satisfied by a hydrolyzable radical selected from the class consisting of halogen and alkoxy radicals, the steps comprising mixing two of said silanes, which differ from each other with respect to the chemical composition of that portion of their molecules exclusive of said hydrolyzable radicals, hydrolyzing the mixture, intercondensing the hydrolysis products and recovering therefrom the unsymmetrical argano-disiloxane. No. 2,449,940. James Franklin Hyde (to Corning Glass Works).

Compound from the group consisting of the 3,5-dialkylcyclohexyl glycols wherein the dialkylcyclohexyl group is directly attached to a carbon atom bearing one of the hydroxyl groups and wherein the two hydroxyl groups are in the 1,3- position relative to each other on carbon atoms in a side chain of at least 4 carbon atoms, their carboxylic acid esters, and their ethers. No. 2,449,956. Edward C. Shokal and Rupert C. Morris (to Shell Development Co.)

Dicyclohexylammonium nitrate. No. 2,449,962. Aaron Wachter and Nathan Stillman (to Shell Development Co.).

Preparing a beta-substituted propionic acid which comprises bringing together in aqueous solution beta-propiolactone and a water-soluble, ionizable, inorganic salt of a hydracid, and then acidifying the solution. No. 2,449,987. Thomas L. Gresham (to The B. F. Goodrich Co.).

Preparing an aliphatic dicarboxylic acid in which the two carboxyl groups are in beta position with respect to one another which comprises bringing together, in solution in a polar solvent selected from the class consisting of water and alcohol, reactants consisting of a water-soluble saturated aliphatic beta-lactone and inorganic cyanide having the formula MCN wherein M is selected from the class consisting of hydrogen, ammonium and alkali and alkaline earth metals, while maintaining the temperature of the solution between its freezing point and its boiling point to form in solution a beta-cyano carboxylic acid compound, subjecting the solution containing the said compound to hydrolizing conditions to convert the cyano group to a carboxyl group and then recovering the resulting dicarboxylic acid. No. 2,449,988. Thomas L. Gresham (to The B. F. Goodrich Co.).

Preparing a beta-thio-carboxylic acid by reacting in a polar solvent for the reactants a saturated aliphatic beta-lactone and a water-soluble inorganic sulfide. No. 2,449,989. Thomas L. Gresham (to The B. F. Goodrich Co.).

Preparing a salt of a beta-acyloxy carboxylic acid which comprises reacting in a polar solvent for the reactants selected from the class consisting of water and alcohol, a water-soluble unsubstituted saturated aliphatic beta-lactone with a water-soluble salt of a carboxylic acid containing hydrogen atoms present only in hydrocarbon and carboxyl groups. No. 2,449,990. Thomas L. Gresham and Jacob Eden Jansen (to The B. F. Goodrich Co.).

Bis (3-chloro-4-beta-carboxyethoxyphenyl) dimethyl methane. No. 2,449,991. Thomas L. Gresham and Forrest Shaver (to The B. F. Goodrich Co.).

Preparing a beta-thio carboxylic acid which comprises preparing a solution containing a mercaptan consisting exclusively of mercapto structure attached to a hydrocarbon residue, dissolved in an alkaline aqueous solution, admixing the resulting solution with a water-soluble saturated aliphatic beta-lactone acidifying the solution and recovering the beta-thio carboxylic acid thus formed. No. 2,449,992. Thomas L. Gresham and Forrest W. Shaver (to The B. F. Goodrich Co.).

Preparing a beta-halo-propionic acid from reactants consisting of beta-propiolactone and a hydrogen halide which comprises slowly adding one of the said reactants to a solution of the other of the said reactants in a polar solvent selected from the class consisting of water and glacial acetic acid while agitating and then separating a beta-halo-propionic acid. No. 2,449,993. Thomas L. Gresham and Forrest W. Shaver (to The B. F. Goodrich Co.).

Preparing a beta-acyloxy acyl halide which comprises reacting an acid halide with a beta-lactone. No. 2,449,994. Thomas L. Gresham and Forrest W. Shaver (to The B. F. Goodrich Co.).

Preparing an alky ester of an alpha-beta unsaturated carboxylic acid by bringing a dialkyl sulfate and a beta-lactone into reactive contact. No. 2,449,995. Thomas L. Gresham and Forrest L. Shaver (to The B. F. Goodrich Co.).

Preparing beta-thio dipropionic acid which comprises reacting thiohydracrylic acid and beta-propiolactone in aqueous solution in the presence of an alkali metal hydroxide, and then acidifying. No. 2,449,996. Thomas L. Gresham and Forrest W. Shaver (to The B. F. Goodrich Co.).

Forming an aqueous dispersion comprising as the sole polymerizable component thereof, methyl methacrylate and a vinyl compound from the group consisting of methyl acrylate, ethyl acrylate, styrene, and vinyl acetate and a thiol from the group consisting of alkane and hydroxyalkane thiols. No. 2,450,000. Benjamin W. Howk and Frederick L. Johnston (to E. I. du Pont de Nemours & Co.).

Making substantially pure dimers of alpha-alkyl para-alkyl styrenes by mixing a monomeric alpha-alkyl para-alkyl styrene having not more than 5 carbon atoms in either the alpha or para substituents with previously activated fuller's earth. No. 2,450,027. Arthur J. Warner and Theodore H. Talbot (to Federal Telephone and Radio Corp.).

Isomerization of butene-1 to butene-2 by introducing butene-1 vapor and anhydrous hydrogen fluoride vapor into an isomerization zone to effect substantial conversion of said butene-1 to butene-2 in the absence of substantial polymerization and without substantial change in the carbon skeleton of the butene-1 molecule. No. 2,450,039. Frederick E. Frey (to Phillips Petroleum Co.).

Process which comprises: (1) **reacting a solution of a saturated polyol and water with an olefin oxide,** said polyol containing at least 3 hydroxyl groups, from 3 to 6 carbon atoms per molecule, and only carbon, hydrogen, and oxygen, said olefin oxide being selected from the group consisting of ethylene oxide, propylene oxide, and mixed ethylene and propylene oxide, in the presence of an etherification catalyst; and (2) esterifying the reaction product with an aliphatic, straight chain, saturated, mono-basic acid containing at least 16 carbon atoms, in the presence of an esterification catalyst. No. 2,450,079. Kenneth R. Brown (to Atlas Powder Co.).

In a process for the preparation of phenolphthalein beta, beta-diglucoside octaacetate by the reaction of phenolphthalein and tetraacetylglucosyl bromide in a solvent, the improvement which comprises performing the reaction in the presence of a catalyst selected from the class consisting of silver oxide and silver carbonate, and another catalyst comprising a substance selected from the group consisting of quinoline, isoquinoline, quinaldine, and lepidine, said other catalyst further including an added substance selected from the group consisting of pyridine, alpha picoline, lutidine, and collidine. No. 2,450,086. Ralph A. Hales (to Atlas Powder Co.).

Producing a polyarylalkane by contacting an arylalkane having a hydrogen atom attached to a carbon atom adjacent to the aromatic ring with a lead alkyl, in which all valences of the lead atom are satisfied by alkyl groups, for a time sufficient to decompose said lead alkyl and to form a condensation product from at least 2 molecular portions of said arylalkane. No. 2,450,099. Ralph B. Thompson (to Universal Oil Products Co.).

Furane compound from a furane ester in the presence of a dehydrating agent selected from the group consisting of zinc chloride, phosphoric acid, concentrated hydrochloric acid and aluminum chloride, with a hydrogen halide and an aldehyde having the general formula R_1CHO, where X is a halogen, and R_1 is a substituent taken from the group consisting of hydrogen alkyl. No. 2,450,108. John George Mackay Bremner and David Gwyn Jones (to Imperial Chemical Industries, Ltd.).

Preparing a beta-lactone by reacting a ketene having the formula:

$$R_7R_8C{=}C{=}O$$

wherein R_7 and R_8 each represents a member selected from the group consisting of a hydrogen atom, a methyl group, an ethyl group and a phenyl (C_6H_5—) group, with a carbonyl compound selected from the group represented by the four general formulas:

$$HRC{=}O,\ R_1COR_2,\ R_2CO\ (CH_2)_{m-1}{-}CO{=}R_4,\ \text{and}\ R_5CO(CH_2)_{m-1}{-}CO{-}OR_5$$

wherein R represents a member selected from the group consisting of a hydrogen atom; an alkyl group having the formula C_nH_{2n+1} wherein n is a positive integer from 1 to 4; a benzyl group; a beta-phenylethyl group; and a phenyl (C_6H_5—) group, R_1 and R_2 each represents a member selected from the group consisting of alkyl groups having the formula C_nH_{2n+1} wherein n is a positive integer from 1 to 4; a benzyl group; a betaphenylethyl group; and a phenyl (C_6H_5—) group, R_3, R_4, R_5 and R_6 each represents an alkyl group having the formula C_nH_{2n+1}, wherein n is a positive integer from 1 to 4 and m represents a positive integer from 1 to 3, in the presence of zinc thiocyanate. No. 2,450,117. John R. Caldwell (to Eastman Kodak Co.).

Preparing β-lactones by reacting a ketene having the formula:

$$RR_1C{=}C{=}O$$

wherein R and R_1 each represents a member selected from the group consisting of a hydrogen atom, a methyl group, an ethyl group and a phenyl (C_6H_5—) group, with a carbonyl compound selected from the group represented by the four general formulas:

$$HR_2C{=}O,\ R_4R_3C{=}O,\ R_5{-}CO{-}(CH_2)_{m-1}{-}CO.\ {=}R_6,\ \text{and}\ R_7{-}CO{-}(CH_2)_{m-1}{-}COOR_8$$

wherein R_8 represents a member selected from the group consisting of a hydrogen atom, an alkyl group having the formula C_nH_{2n+1} wherein n is a positive integer from 1 to 4, a benzyl group, a β-phenylethyl group, and a phenyl group (C_6H_5—) R_3 and R_4 each represents a member selected from the group consisting of an alkyl group having the formula C_nH_{2n+1} wherein n is a positive integer from 1 to 4, a benzyl group, a β-phenylethyl group and a phenyl (C_6H_5—) group, R_5, R_6, R_7 and R_8 each represents an alkyl group having the formula C_nH_{2n+1} wherein n is a positive integer from 1 to 4 and m represents a positive integer from 1 to 3 in the presence of a catalyst selected from the group consisting of zinc, copper, calcium, cadmium, magnesium, cobalt, nickel, stannous tin, and ferric perchlorates. No. 2,450,116. John R. Caldwell (to Eastman Kodak Co.).

Preparing a beta lactone by reacting a ketene having the formula:

$$R_7R_8C{=}C{=}O$$

where R_7 and R_8 each represents a member selected from the group consisting of a hydrogen atom, a methyl group an ethyl group and a phenyl (C_6H_5—) group, with a carbonyl compound selected from the group represented by the four general formulas:

$$HRC{=}O,\ R_1R_2C{=}O,\ R_3CO{-}(CH_2)_{m-1}{-}COR_4,\ \text{and}\ R_5CO{-}(CH_2)_{m-1}{-}COOR_6$$

wherein R represents a member selected from the group consisting of a hydrogen atom; an alkyl group having the formula C_nH_{2n+1} wherein n is a positive integer from 1 to 4; a benzyl group; a beta-phenylethyl group; and a phenyl (C_6H_5—) group, R_1 and R_2 each represents a member selected from the group consisting of alkyl groups having the formula C_nH_{2n+1} wherein n is a positive integer from 1 to 4; a benzyl group; a beta-phenylethyl group; and a phenyl (C_6H_5—) group; R_3, R_4, R_5 and R_6 each represents an alkyl group having the formula C_nH_{2n+1} wherein n is a positive integer from 1 to 4 and m represents a positive integer from 1 to 3, in the presence of zinc nitrate. No. 2,450,118. John R. Caldwell (to Eastman Kodak Co.).

Isomerizing a pinene to camphene which comprises heating a pinene in the presence of pyrophylite. No. 2,450,119. William F. Carson, Jr., (to Hercules Powder Co.).

An acidic partial ester containing: (a) at least one polyhydric alcohol radical; (b) at least one diglycollic acid radical; and (c) a plurality of acyloxy radicals, each having 8 to 32 carbon atoms derived from any detergent-forming monocarboxy acid having 8 to 32 carbon atoms, with the proviso that at least one of said acyloxy radicals is the acyloxy radical of an hydroxylated detergent-forming monocarboxy acid having 8 to 32 carbon atoms, each of said polyhydric alcohol radicals being ester-linked with a plurality of groups, each of said groups contains at least one of said acyloxy radicals, the number of said groups ester-linked to each polyhydric alcohol radical being at least equal in number in each instance to the valency of the polyhydric alcohol radical, so that each polyhydric alcohol radical is completely esterified and being additional to the number of such groups ester-linked to any other polyhydric alcohol radical contained in the ester, and at least one of said groups containing a free diglycollic acid radical. No. 2,450,124. Melvin De Grotte and Arthur F. Wirtel (to Petrolite Corp., Ltd.).

Preparing β-propionolactone comprising reacting ketene ($CH_2{=}C{=}O$) with formaldehyde in the presence of triethyl orthophosphate. No. 2,450,131. Hugh J. Hagemeyer, Jr. (to Eastman Kodak Co.).

Preparing a mixture of monolactone which comprises passing gaseous ketene into a vigorously stirred solution of dibenzoyl methane having dissolved therein boron trifluoride etherate, neutralizing the catalyst with a solution of a weak alkali, and separating the lactone mixture from the residue. No. 2,450,132. Hugh J. Hagemeyer, Jr. (to Eastman Kodak Co.).

Preparing β-lactones by reacting a ketene selected from the following formula: $RR_1C{=}C{=}O$ wherein R and R_1 each represents a member selected from the group consisting of a hydrogen atom, a methyl group, an ethyl group and a phenyl (C_6H_5—) group, with a carbonyl compound selected from the group represented by the four general formulas:

$$HR_2C{=}O,\ R_3R_4C{=}O,\ R_5CO(CH_2)_{m-1}{-}CO{-}R_6,\ \text{and}\ R_7CO(CH_2)_{m-1}{-}COOR_8$$

wherein R_2 represents a member selected from the group consisting of a hydrogen atom; an alkyl group having the formula C_nH_{2n+1} wherein n is a positive integer from 1 to 4; a benzyl group; a β-phenylethyl group; and a phenyl group, R_3 and R_4 each represents a member selected from the group consisting of alkyl groups having the formula: C_nH_{2n+1} wherein n is a positive integer from 1 to 4; a benzyl group; a β-phenylethyl group; and a phenyl group, R_5, R_6, R_7, R_8 each represents an alkyl group having the formula: C_nH_{2n+1} wherein n is a positive integer from 1 to 4 and m is a positive integer from 1 to 3, in the presence of at least one catalyst selected from the group of metal fluoroborates represented by the following formula: $X(BF_4)_2$ wherein X represents a divalent metal cation selected from the group consisting of cadmium, copper, iron, nickel, lead, stannous tin and zinc. No. 2,450,133. Hugh J. Hagemeyer, Jr. (to Eastman Kodak Co.).

Making beta-lactones by reacting a ketene having the formula: $RR_1C{=}C{=}O$ wherein R and R_1 each represents a member selected from the group consisting of a hydrogen atom, a methyl group, an ethyl group and a phenyl (C_6H_5—) group with a carbonyl-containing compound selected from the group consisting of aldehydes having the formula: R_2CHO wherein R_2 represents a member selected from the group consisting of a hydrogen atom, and an alkyl group having the formula C_nH_{2n+1} wherein n is a positive integer from 1 to 4, a benzyl group, a beta-phenyl ethyl group, and a phenyl (C_6H_5—) group, ketones having the formula: $R_3R_4C{=}O$ wherein R_3 and R_4 each represents a member selected from the group consisting of alkyl groups having the formula C_nH_{2n+1} wherein n is a positive integer from 1 to 4, a benzyl group, a beta-phenyl ethyl group and a phenyl (C_6H_5—) group, diketones having the formula: $R_5CO(CH_2)_{m-1}{-}COR_6$ and keto-esters having the formula: $R_7CO(CH_2)_{m-1}{-}COOR_8$ wherein R_5, R_6, R_7 and R_8 each represents an alkyl group having the formula C_nH_{2n+1} wherein n is a positive integer from 1 to 4 and m represents a positive integer from 1 to 3, in the presence of from 0.1-3% by weight based on the total weight of the reaction mixture of a catalyst having the formula: $H_2(X)_2$ wherein X represents a member selected from the

group consisting of a chlorine atom and a bromine atom. No. 2,450,134. Hugh J. Hagemeyer, Jr. (to Eastman Kodak Co.).

Production of an allyl polyether of a polyglycerol having one allyloxy radical attached to each glycerol unit which comprises bringing stannic chloride into contact with allyl glycidyl ether. No. 2,450,234. Theodore W. Evans and Edward C. Shokal (to Shell Development Co.).

Acidic partial ester of a polycarboxy acid with dimerized 9,11-linolodiricinolein. No. 2,450,332. Melvin De Groote (to Petrolite Corp.).

Acidic partial ester containing a polyhydric alcohol radical; a diglycollic acid radical; an acyloxy radical containing 8 to 32 carbon atoms derived from a detergent-forming monocarboxy acid having 8 to 32 carbon atoms, at least one polyhydric alcohol radical being ester-linked with a group containing said acyloxy radical and the number of said groups ester-linked with at least one polyhydric alcohol radical being less than the valency of said polyhydric alcohol radical. No. 2,450,333. Melvin De Groote and Arthur F. Wirtel (to Petrolite Corp., Ltd.).

Trademarks of the Month

A Checklist of Chemical and Chemical Specialties Trademarks

Thermogen. Fluid fuel for cutting and welding metals which consists of a combination of liquefied petroleum and ethyl ether. 440,751. Thermogen Corp.

RUST-OLEUM. Ready-mixed paint used as a rust preventative. 441,010. Rust-Oleum Corp.

F:HAGA. Bleached sulfite pulp for the manufacture of paper and rayon. 490,616. Aktiebolaget Molnback-Trysil.

COLOSSUS. Steel wool, pumice, and other polishing stones and chemically treated polishing cloths. 490,969. James H. Rhodes & Co.

Sheer Loads of Suds. Household cleaning preparation. 494,428. Detergent Products, Inc.

JAV. Cleaning and scrubbing preparations and soaps. 495,389. "J A V", Societe Anonyme.

DRI-GLOSS. Wax finish for tile, marble, terrazzo, and floor surfaces. 496,454. Miniwax Co., Inc.

DRIOCAN. Packaged adsorbent material for absorbing excess moisture. 496,921. Porocel Corp.

VINTEX. Polyvinyl resin sheets for general use. 497,948. Middletown Rubber Corp.

DURA-SEAL. Pressure sensitive adhesive sheets. 498,050. Beutex Corp.

THE MASTER OF FLAME. Portable hand and wheel-mounted fire extinguishing equipment. 498,195. Ansul Chemical Co.

SPIDER. Device coated with DDT crystals for use as an insecticide. 501,991. Joseph W. Lawlor d/b/a Atlantic Cable Splicing Co.

Yamtox. Insecticides used for spraying plants. 502,417. Plant Products Corp.

Sage AIR REFRESHER DISPELS ODORS. Wishbone Wick does the trick. Compound of aromatic and essential oils formulated as to be self disseminating and to deodorize the atmosphere. 502,423. Sage Laboratories, Inc.

GUMOUT. Solvent preparation used for removing grease, tar, wax, carbon, printer's ink, glue, rust, and like materials from metal, glass, and like articles; for cleaning paint from paint brush bristles and other articles; and for mixing with gasoline used as fuel in internal combustion engines to relieve sticky valves. 502,768. Pennsylvania Refining Co.

ROGERS. Insecticide in powder form. 502,770. Rogers Exterminating Co.

SILVER Service. Preparations for cleaning, polishing and preserving silver. 502,955. Thermocor Products, Inc.

LANO-VELT. Cleaning preparation in powder form for general household use. 502,957. J. R. Watkins Co.

PATEX INKEX. Liquid compound for removing ink from fabric. 505,915. Patek & Co.

Fox-Klenzed. Cleaning fluid for cleaning and treating furs. 506,591. I. J. Fox, Inc.

MODICOL. Organic wetting agents for use as stabilizers and pigment dispersing aids in the compounding of natural and synthetic rubber latices. 507,333. Nopco Chemical Co.

AED. Furniture polish. 507,574. Alonzo E. Davis.

ALAKA. Varnish and pyroxylin lacquers, paint enamels, paint and varnish thinning liquids, paint and varnish solvents, ready-mixed paints, asphalt paints, paint primers, paste paints, and rubber based paints. 508,048. Lacquer & Chemical Corp.

Koroseal. Transparent and opaque resinous plastic material sold in sheet form. 509,417. B. F. Goodrich Co.

Barton. Compositions containing chemical ingredients for sealing engine blocks; sealing leaks in automobile radiators; cleaning automobile radiators; restoring lost power in automobile engines by dissolving gum and sludge, freeing sticky valves and preventing carbon from forming in the cylinders; eliminating and preventing rust in the cooling system of an automobile; sealing automobile ignition wires to prevent absorption of moisture and water; a conditioner for gasoline and fuel oil, i.e. absorbs moisture, reduces carbon formation, prevents clogging of burner; brake fluid. 510,824. Carl J. Barton d/b/a Barton Products Co.

PROPASOL. Chemical preparation for use as a solvent and adapted for use also as a fumigant and an insecticide. 510,935. Carbide & Carbon Chemicals Corp.

LYNCH. Paints and varnishes for house and industrial use. 511,485. W. J. Lynch Paint & Varnish Co.

TRANSGLO. Semi-liquid wallpaper wax. 511,615. Herbert S. Ingber d/b/a Transglo Co.

all. Detergents for use as a laundry powder. 511,799. Detergents, Inc.

Koroseal. Coated and impregnated fabrics of natural and synthetic fibers and flexible plastic film. 511,811. B. F. Goodrich Co.

LUMINEX. Plastic-coated polyvinyl resin films useful as a substitute for leather and fabric, in the piece. 512,658. Fisher Plastics.

BULL DOG. Plastic material in the form of rigid, semi-rigid and flexible sheets. 513,385. Boston Woven Hose & Rubber Co.

ALKYTEX. Ready-mixed paint for sash and trim. 513,577. Morris Paint & Varnish Co.

SOILMASTER. Compound containing chlorobromomethane for use in the treatment and fumigation of soil for the control of nematodes. 513,833. Michigan Chemical Corp.

GDC. Detergents for washing, scouring and cleansing all kinds of textile materials in all conditions and stages of manufacture; for washing, scouring and cleansing hides, leather, metals, machinery, painted and lacquered surfaces, oil wells; and for household use. 514,029. General Dyestuff Corp.

VISKING PRODUCT. Thin flexible plastic sheets designed for a variety of non-associated uses. 514,452. Visking Corp.

"DUTCH GIRL". Clothes bleach. 514,792. Ardmore Chemical Co.

(Symbol). Chemical products derived from corn—namely, modified whole protein from corn gluten and zein—for adhesive purposes. 514,940. Corn Products Refining Co.

CHLORBROM. Chemical fire extinguishing composition for use in ordinary fire extinguishers. 515,506. Michigan Chemical Corp.

MICROPLASTIC. Plastic Protective coatings for electrolytic plating tanks and racks. 515,577. Michigan Chrome & Chemical Co.

CURIX. Sensitized photographic papers, plates, films, rollfilms, portrait films, studio films, flat films, pack films, x-ray films, films used in the graphic arts of printing, process engraving and the like, cinematographic films, cameras and parts therefor, non-sensitized photographic accessories—namely, developing frames, cinematographic cameras and projectors. 516,127. Gevaert Photo Producten, N.V.

roberts. Ready mixed paints, paste paints, wood stains, varnishes, varnish stains, paint enamels, chemical paint and varnish removers, fillers for use by painters, and colors in oil. 516,574. Roberts Paint Corp.

Color-ado. Cement base paint for waterproofing masonry. 516,910. James H. Naden d/b/a J. H. Naden Sales Co.

I.M.P. Metal dust-containing compositions in the nature of a paint for coating metals—namely, resin-metal dust coating compositions and alkali silicate-metal dust coating compositions and ingredients therefor. 517,060. Industrial Metal Protectives, Inc.

(Symbol). Paint enamels; paint enamel undercoats; ready-mixed exterior paints; paint oils; liquid paint and varnish remover; varnishes; liquid finishes for wood floors in the nature of paints, enamels, varnishes, and lacquers; liquid fillers and surfacers for wood floors—namely, varnishes, fillers, oil stains, synthetic clear coatings and pigmented floor enamels; wood stains; oil paints; varnish stains; sign painter paints; asphaltum paint; bronzing liquid; paint dryers; lacquers; paint primers and glazing liquids. 517,281. O'Brien Corp.

MILFORD. Ready mixed oil paints, paint enamels, varnishes, lacquers, primer paint, and surfacer paint. 517,669. Rinshed-Mason Co.

ADVAWET. Chemical wetting agents, emulsifiers, for paints, varnishes, resins, and oils. 517,687. Advance Solvents & Chemical Corp.

PLAX. Paint enamels and varnishes. 518,446. Lowe Brothers Co.

BRS. Tar-like liquid bituminous material for compounding rubber. 518,864. Allied Chemical & Dye Corp.

Rainbow. Hand Cleaner and hectograph ink remover. 519,259. Columbia Ribbon & Carbon Mfg. Co., Inc.

HAKO SHORT. Emulsifier of shortening and water for enhancing and retaining the quality of finished bread. 519,751. Hachmeister Inc.

Regal. Hydraulic brake fluid. 519,816. Julius Goldner d/b/a Regal Chemical Co.

Sta-Sol. Lecithin concentrate. 520,360. A. E. Staley Mfg. Co.

BROMOFUME. Soil and grain fumigants. 520,500. Eston Chemicals, Inc.

ZYLAR. Zinc calcium resinate used principally in coating and plastic compositions including printing inks. 520,966. Newport Industries, Inc.

HURRICANE. Powdered cleaning composition especially for cleaning auto bodies, chrome, tires, glass, and other exposed parts; and for powdered metal polish for chrome and other metal parts and fixtures. 521,301. Leland J. Wilhartz d/b/a Lakeside Products.

B and R. Spot remover. 521,318. Brannan and Ross Chemical Products Co.

Carbutone. Chemical preparation for dissolving sludge in carburetors in internal combustion engines. 521,677. Adam Ogint d/b/a Carbutone Mfg. Co.

IRV-O-GLAS. Coated glass fiber cloth. 522,097. Irving Varnish & Insulator Co.

SONCO. Chemical dyestuffs. 522,614. E. Sonnenschein & Co., Inc.

Citrus. Washing powder. 523,187. Pacific Soap Co.

ELKO. Radiator stop leak preparation. 523,251. Tiffie C. Elkins d/b/a Elko Div. of W. C. Mfg. Co.

PHARISTYLE. Tile and floor covering composed in whole or in part of rubber. 523,612. Pharis Tire & Rubber Co.

Formula K-17. Brake fluid. 524,151. Porte Mfg. Co., Inc. d/b/a Joray Mfg. Co.

AIRITE. Nitrous oxide, carbon dioxide; insecticides, insect repellants and odor control mediums. 524,259. William B. Threm d/b/a Airtite Mfg. Co.

FLAMEX. Flame proofing compound for all fabrics. 524,354. Selig Co.

DENDROL. Insecticides. 525,126. Standard Oil Co.

VELSICOL. Hydrocarbon solvents, preponderately composed of aromatic hydrocarbons. 525,717. Velsicol Corp.

SHERWIN-WILLIAMS. Soap (dry, powdered, paste, semi-paste, flake, liquid, and other consistencies), metal polishes. 524,729. Sherwin Williams Co.

GIBBSBORO. Paints (dry, paste, or ready-mixed); varnishes; wood fillers; and painters' materials—namely, driers, white lead, white zinc, japans and colors (dry, paste or ready-mixed). 525,891. John Lucas & Co., Inc.

Encaustic. Floor enamel and porch paint. 526,602. A. Burdsal Co.

surge. Detergent washing powder with a wetting agent added. 526,677. Babson Bros.

Ultra LUMINALL. Paste paints. 526,704. National Chemical & Mfg. Co.

Paco. Ethyl acetate, butyl acetate, amyl acetate, methanol, and denatured alcohol, industrial solvent mixtures containing essentially denatured alcohol, methanol, and ethyl acetate. 526,798. Publicker Industries, Inc.

TAPE-EZE. Chemical preparation to be added to the water of a tape dispensing machine for conditioning the glue of the gummed tape dispensed thereby. 526,974. Rohloff Mfg. Co.

RUHM'S. Fertilizer. 527,199. Ruhm Phosphate & Chemical Co.

Simplot BLUE DIAMOND. Fertilizers, more particularly complete fertilizers. 527,437. John R. Simplot.

Simplot GREEN DIAMOND. Fertilizers, more particularly ammoniated phosphate. 527,467. John R. Simplot.

Simplot RED DIAMOND. Fertilizers, more particularly superphosphate. 527,468. John R. Simplot.

NALCITE. Ion exchange compositions used in the softening and purifying of water and in the purifying of liquid mediums, other than water. 527,935. National Aluminate Corp.

Sheer. Sudsing cleaner, cleanser and detergent. 528,016. Procter & Gamble Co.

WAX-O-NAMEL. Paint enamel containing wax. 528,101. S. C. Johnson & Son, Inc.

PET-EEZ. Preparation containing fungicidal, germicidal, and deodorant properties for animal use. 528,378. Ridd Laboratories, Inc.

TAKE HOLD. ½ monopotassium phosphate and ½ diammonium phosphate for a starter solution for transplanting vegetables and fruits. 528,543. Victor Chemical Works.

AZO PHLOXINE. Dyes and dyestuffs. 528-565. General Dyestuff Corp.

VITEX. Chemically treated paraffin for use in restoring finishing oils to and in sizing silk, wool, and like garments after dry cleaning. 528,773. Cobar Laboratories, Inc.

BULCO. Insecticides. 528,908. W. H. Bull Medicine Co.

ANGUS SUPERFINE. Pigment filler for paper filling. 529,287. A. M. Meincke & Son, Inc.

Aeroglas. Synthetic thermosetting resins and plastics of the polyester type. 529,430. American Cyanamid Co.

FILMOLEEN. Cleaning fluid for cleaning photographic film. 529,559. Bell & Howell Co.

KALSI-KOTER. Flat oil paint either in paste or liquid form. 529,679. National Gypsum Co.

GIANT. Soap. 529.852. Armour & Co.

INDUSTRIAL. Soap. 529,854. Armour & Co.

HOSPITAL GREEN. Soap. 529,855. Armour & Co.

HORSE-SHOE. Lye, 529,863. B. T. Babbitt, Inc.

WHITEKOTE. Moth preventative and insecticide. 530,397. Galree Products Co., Inc.

BURTON SALTS. Water hardening composition for use in the brewing industry. 530,449. Wallerstein Co., Inc.

SUPREMO. Tanning extracts. 530,512. International Products Corp.

SAFE N SURE. Plant food or fertilizer. 530,591. Geo. Tait & Sons, Inc.

Davey TREE FOOD. Fertilizers. 530,628. Davey Tree Expert Co.

FIRSEAL. Varnish and clear varnish sealer. 531,382. James B. Sipe & Co.

KILRUST. Mixture of paint oils for inhibiting oxidation of metals. 531,383. James B. Sipe & Co.

Luster-bryte. Wax finish for floors, wood, rubber, asphalt, linoleum, composition, mastic, etc. 531,633. U. S. Sanitary Specialties Corp.

DIVERSEY. Wood flour seal and finish in the nature of a varnish, wood flour seal, water emulsion floor wax, and chemical preparation in powdered form for removing paint and finishes. 531,780. Diversey Corp.

ASDURA. Paint sold in liquid form. 531,827. Patek Brothers, Inc.

P.D.Q. Paint enamel. 531,828. Patek Brothers, Inc.

LUPERSOL. Liquid compounds of solutions containing organic peroxides in combination with organic or inorganic fillers or diluents. 532,052. Novadel-Agene Corp.

FLOOR SHINE. Cleanser for terrazzo, marble, cement, hard tile and traverting flooring. 532,140. Walter G. Legge Co., Inc.

FLOSSCOTE. Paint sold in paste form. 532,867. Patek Brothers, Inc.

SLUG. Chemical compound for use as a drain cleaner. 533,409. Service Industries.

Hampden. Detergents for industrial usage. 533,563. Hampden Color & Chemical Co.

sun-sect. Combined sun tan lotion and insect Repellent. 533,974. **John A. Bacon d/b/a** Bacon Associates.

Clover Leaf Varnishes, japans, ready-mixed paints, paint enamels, bronzing liquids, oil stains, varnish stains and wood penetrating stains, liquid and paste dryers for paint and varnish, liquid and paste fillers for wood, colors in oil lacquers, prepared shellac, shellac substitutes, and oil finish varnish. 534,243. Clover Leaf Paint & Varnish Corp.

dimity. Sudsing cleaner, cleanser, and detergent. 534,339. Procter & Gamble Co. d/b/a Globe Soap Co.

r. Stick glue for securing abrasive discs to back up discs and liquid cement for securing abrasive granules to irregular base surfaces for manufacturing abrasive forms. 534,354. Rockwell Manufacturing Co.

TELON. Thermoplastic and thermosetting molding compounds, cast resins, oil soluble resins, and synthetic resins in general, sold in the form of powder, granules, sheets, rods, and liquids, used in the textile, lacquer, and varnish, paper, and plywood industries. 534,461. Omni Products Corp.

TEXPLAS. Thermoplastic and thermosetting molding compounds, cast resins, oil soluble resins, and synthetic resins in general, sold in the form of powder, granules, sheets, rods, and liquids, used in the textile, lacquer and varnish, paper, and plywood industries. 534,462. Omni Products Corp.

check shock. Hydraulic shock absorber fluid and hydraulic brake fluid. 534,702. Windsor-Lloyd Products, Inc.

Wash Wiser. Diaper wash comprising a preparation having deodorizing, disinfecting and bleaching properties, and having incidental cleaning properties. 534,777. Wencel F. Hetman d/b/a Hetman & Co.

MARATHON Endurance MOTOR OIL. Lubricating motor oils. 534,803. Ohio Oil Co.

MARATHON BEST IN THE LONG RUN. Motor fuel oil, fuel oil for heating and illuminating purposes, lubricating oils and greases. 534,804. Ohio Oil Co.

CYKORAN. Sensitized photographic paper. 535,025. General Aniline & Film Corp.

SELECTONE. Parasiticides—namely, insecticides, fungicides, and herbicides and compounds which influence specific physiological processes in plants—namely, plant hormones. 535,220. California Spray-Chemical Corp.

(Symbol). Varnishes. 535,295. **Bissell** Varnish Co.

Q. Lubricating oils and greases; cutting oils for cooling and lubricating cutting tools on metal machinery operations; oils for lubricating needles and sinkers on knitting machines; rust preventative containing oil and grease, varnish-like and waxy in character, for coating metals. 535,873. Quaker Chemical Products Corp.

"TRI-BASIC." Copper fungicides. 536,313. Tennessee Copper Co.

FARMCOTE. Paint sold in paste form. 536,432. Patek Brothers, Inc.

SLUG-O. Preparation for killing slugs, snails, and other pests. 537,263. Andrew Wilson, Inc.

CHINCH-O. Insecticides. 537,266. Andrew Wilson, Inc.

Bright Sail. Ammonia, washing sal soda used as a water softener, laundry bleach, liquid blue, and laundry starch. 538,125. Great Atlantic and Pacific Tea Co.

Gingham Girl. Self-polishing wax for floors and linoleum and for furniture polish having incidental cleaning properties. 538,157. J. W. Moyer d/b/a J. W. Moyer & Sons.

COLLURE. Paint enamel. 538,362. Chicago Paints, Inc.

Mercolite. White paint enamel for exterior or interior use. 539,069. M. J. Merkin Paint Co., Inc.

SUCO. Ultramarine blue, laundry blue, iron blue; organic red pigments of the azo group as follows: para red pigments, lithol red pigments, toluidine red pigments, red lake C pigments, permanent rot R red pigments, guyandot red pigments, virginia red pigments; organic orange pigments of the azo group as follows: azo orange lo pigments, permanent orange pigments; triphenylmethane dyes as follows: acid blue, soluble blue, fuchsine; alkali blue toner, methyl violet toner, and blanc fixe (barium sulfate). 539,097. Standard Ultramarine Co.

BLUE BELL. Paint in paste and liquid form. 539,276. Continental Paint & Varnish Co.

Enoz. Insecticides and moth preventative and exterminator. 539,290. Diversey Corp.

STRETCH. Water softener with incidental cleaning properties. 539,561. Morton S. Pine Co.

Bee-Ar. Varnishes. 540,369. Blue Ribbon Paint Co.

SOOTOUT. Carbon binder solvent, sludge solvent and soot remover. 540,459. Leo J. Sauerborn d/b/a Lubaid Co.

ARMOLITH. Paste paint. 540,624. Armstrong Paint & Varnish Works.

BOCONIZE. Chemical compounds used to make fabrics moth resistant. 540,978. Bocon Chemical Corp.

L-S-O. Liquid chemical to be added to industrial, marine and locomotive fuel oil to remove soot and carbon scale. 541,192. Leo J. Sauerborn d/b/a Lubaid Co.

(Symbol of Statue of Liberty). Soap, dry cleaning compound, general cleaning or washing compounds, metal polish, and compounds for use in cleaning and polishing porcelain, painted, and similar surfaces. 541,359. U. S. Sanitary Specialties Corp.

CELANESE. Chemicals for industrial and other uses, such as plasticizers, lubricant additives, solvents and intermediates—namely, organic phosphates, such as triphenyl phosphate and tricresyl phosphate; aldehydes such as formaldehyde, acetaldehyde and propionaldehyde; organic acids, such as acetic acid and propionic acid; ketones such as acetone and methyl ethyl ketone; alcohols, such as methyl, ethyl, propyl and butyl alcohols; organic oxides, such as tetrahydrofurane and methylal; and glycols, such as 2-methyl-1,3-pentanediol. 541,810. Celanese Corp. of America.

(Symbol). Bleaching, cleansing, antiseptic and germicidal compound. 542,285. Clorox Chemical Co.

RUSTEZE. Chemical preparation for removing rust stains from textile materials. 542,470. Hood Chemical Co., Inc.

HINJ. Emulsifying, dispersing, solubilizing, and wetting agents. 543,872. Atlas Powder Co.

ANT-GO. Poisonous insecticide for the control of sweet-eating ants. 544,476. W. R. Sweeney, Mfgr.

HY-LO. Powder and liquid spray insecticide for the control of house flies, fleas, bed bugs, ants, poultry lice, crickets, and cabbage and melon worms. 544,477. W. R. Sweeney, Mfg.

SWEENEY'S. Rat, mouse, mole, and gopher poison; insecticide for the control of sweet-eating ants; insecticide spray for plants; insecticide for moths; fly and mosquito repellent spray for farm stock; and disinfectant dips for farm stock and poultry. 544,478. W. R. Sweeney, Mfgr.

SAFE-N-LEAD. Insecticides and fungicides. 545,294. Sherwin-Williams Co.

SPRED-RITE. Insecticides and fungicides. 545,297. Sherwin-Williams Co.

FIENDOIL. Chemical composition for the prevention of corrosion. 545,383. McCambridge & McCambridge Co.

FORMULA 12. Rug, fabric, and automobile cleaning preparation. 545,453. Cudahy Packing Co.

CRYSTEX. Sulfur. 545,595. Stauffer Chemical Co.

PARA-FLUX. Plasticizer and flexing material for rubber and synthetic rubbers. 545,982. C. P. Hall Co.

LITHOLITE. Lithium salt of a long chain fatty acid having lubricating properties of itself, and also used as an ingredient in conjunction with other lubricating materials such as minerals, vegetables, mammalian and piscine oils, waxes and synthetic chemicals used as lubricants. 546,212. Foote Mineral Co.

DOMINO. Solvent for use in duplicating processes. 546,374. Ditto, Inc.

MEL-O-AIR. Industrial deodorants. 546,573. Michael Fielding d/b/a Modern Deodorant Co.

"MUST." Powdered soap and washing compounds for laundry purposes. 546,880. Scientific Supply Co.

Azed. Compositions in the nature of electrolytes and addition agents for use in the continuous plating of metals by acid zinc and acid zinc alloy electro-deposition processes. 547,148. Poor & Co.

GREETING. Bar soap in packaged form. 547,772. Lee Rothchild d/b/a Corona Soapcrafters.

SALUTATION. Bar soap in packaged form. 547,774. Lee Rothchild d/b/a Corona Soapcrafters.

ARM & HAMMER BRAND. Bicarbonate of soda (baking soda). 547,895. Church & Dwight Co., Inc.

GAVIOTA BRAND. Fertilizers. 548,099. Pacific Chemical & Fertilizer Co.

PANAFLEX. Plasticizers to impart flexibility or elasticity to plastics, resins, rubber elastomers, polymers, protective coatings, inks and other similar products. 548,681. Pan American Refining Corp.

DURA-NETT. Preservative treating chemicals for fishnets. 548,763. Louis W. Schatz d/b/a General Plastics Mfg. Co.

WATERTECTER. Composition of matter including an ingredient which changes color upon contact with water. 549,009. Rudolph L. Schwartz d/b/a Watertecter Co.

PLUMB KLEEN. Solvent for cleaning drain pipes, plumbing, oil burners, radiators, etc. 549,358. Western Chemical Co.

(Symbol). Chemical mixture for repelling and killing moths, their larvae and eggs. 549,746. Paradize Products Corp.

Paradize. Chemical mixture for repelling and killing moths, their larvae and eggs. 549,747. Paradize Products Corp.

ALDET. Surface active detergents. 549,836. Oronite Chemical Co.

VIDET. Surface active detergents. 549,837. Oronite Chemical Co.

E. Insecticides. 550,067. **Penola** Inc.

Maid of Honor. Insecticides and moth preventatives. 550,086. Sears, Roebuck & Co.

Auto-Chlor. Chemical solutions for sterilizing eating utensils. 550,378. **Auto-Chlor** System, Inc.

Golden Key. Liquid preparation for cleaning glass, and a general household cleanser in powder form. 550,501. Great American Tea Co.

Golden Key. Preparation in powder form for cleaning closet bowls. 550,502. Great American Tea Co.

Golden Key. Cleanser pads containing soap for cleaning kitchenware and aluminum; a preparation in powder form for general household cleaning having incidental water softening properties; and a preparation in liquid form for cleaning white shoes. 550,503. Great American Tea Co.

GRIFFIN. Cleaning fluid for wearing apparel, fabrics, upholstery, and carpets; and liquid preparation for cleaning and polishing shoes. 550,693. Griffin Mfg. Co., Inc.

Golden Key. Cleansing preparation in powder form. 550,917. Great American Tea Co.

Teratone. Cleanser and renovator for terrazo floors. 551,167. Carsolite Corp.

RED MILL SOLID NEUTRAL RED OIL SOAP. Soap. 552,294. M. Werk Co.

REDOTEX FLAKES NEUTRAL RED OIL SOAP. Cleaning compound for general laundry, textile, and similar industrial uses. 552,295. M. Werk Co.

WERK'S HYTEXAL. Cleaning compounds for general laundry purposes. 552,297. M. Werk Co.

WERK'S LT 60. Cleaning compound for general laundry, textile, and similar industrial uses. 552,298. M. Werk Co.

GLAMYLOL. Antiseptics containing as an active ingredient a quaternary ammonium compound. 553,438. Wallace & Tiernan Products, Inc.

DYACOL. Photographic chemicals. 555,009. Clarence E. Payne d/b/a Dyacol Products Laboratory.

UNDEX. Fungicidal ointment and fungicidal powder. 557,120. William C. Dabney, Jr., d/b/a Dabney Pharmacal Co.

BIG BOSS. Laundry bar soap. 558,349. Cudahy Packing Co.

BUCKSHOT. Laundry soap in powdered form. 558,351. Cudahy Packing Co.

VICAR Won. All-purpose cleanser in powder form. 558,830. Virginia-Carolina Chemical Corp.

BRITEN-ZIT. Liquid cleaner for floors and woodwork. 559,447. Hillyard Chemical Co.

WATEX. Sudsing cleaner, cleanser, and detergent. 559,545. Procter & Gamble Co.

Chiffon. Soap. 560,157. Armour & Co.

DUNK. Cleanser for removing gum, carbon, and grease from any type metal and particularly carburetors, fuel pumps, and motor blocks. 560.267. Hobb-Swetnam Co., Inc.

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